

TECHNOLOGY DEPT:

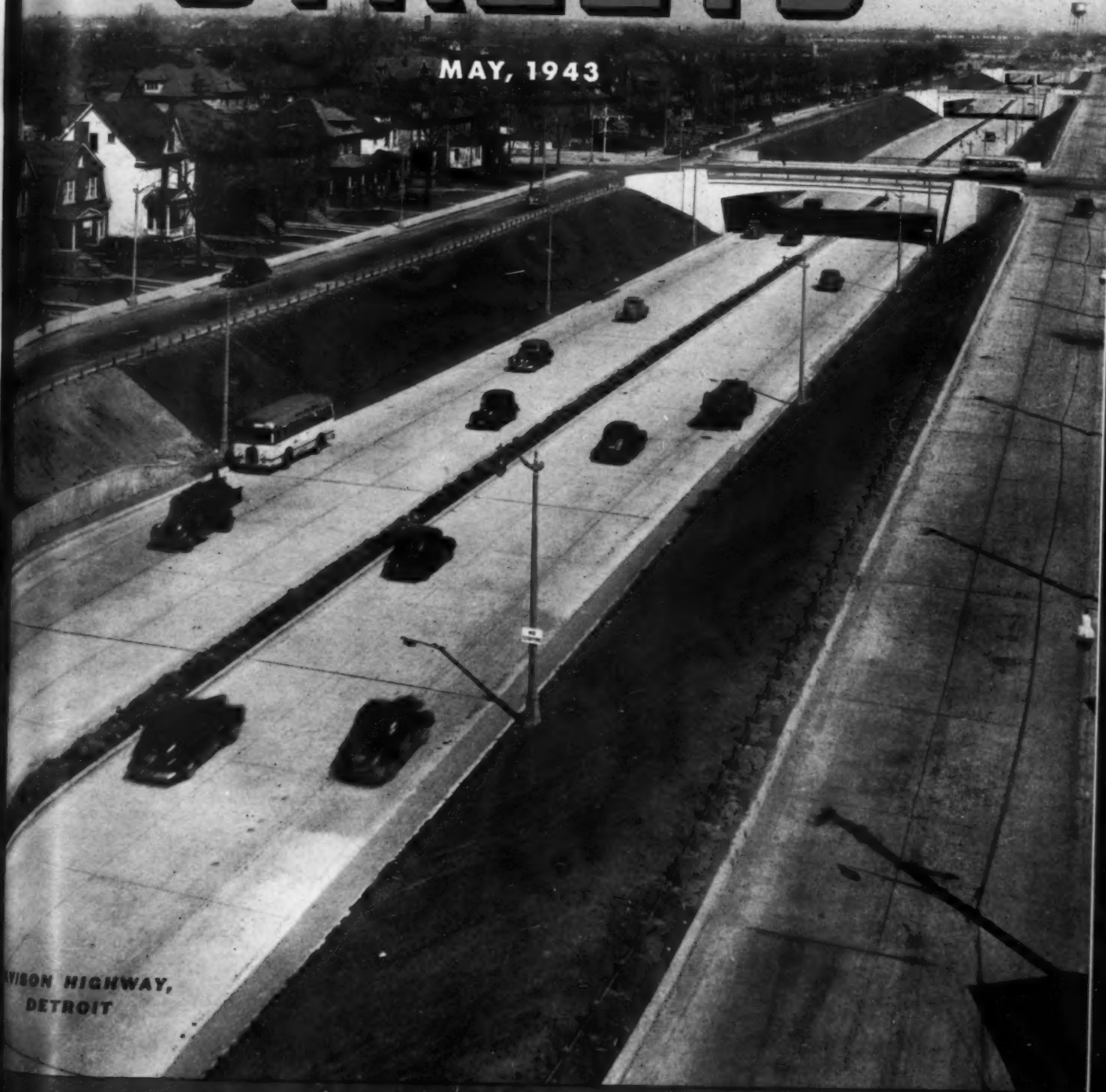
# ROADS AND STREETS

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MAY 24 1943

DETROIT

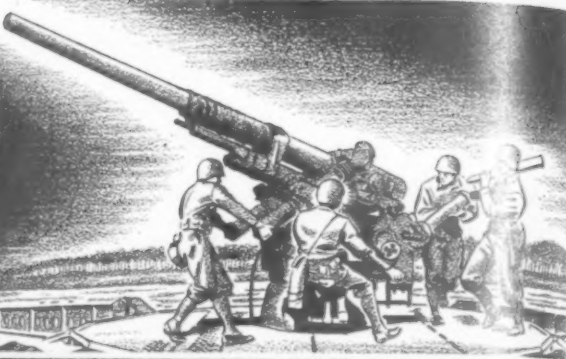
MAY, 1943



VISION HIGHWAY,  
DETROIT

**In This Issue:** A R B A Post War Conference — Corn  
Country Road Upkeep — Million-Yard Winter Runway Job —  
Undersealing Joints with Asphalt — Vermont's Longest Bridge —  
Street Repairs by School Boys — Equipment Repair Kinks

# Rigidity



## TO KEEP YOUR GRADERS ROLLING FOR VICTORY...

- ✓ Check condition of engine regularly.
- ✓ Change lubricating oil and renew filter elements every 100 hours of use.
- ✓ Lubricate all parts of grader regularly.
- ✓ Service air cleaner every 10 hours of use.
- ✓ Clean fuel oil filters at least every 60 hours.
- ✓ Don't ride clutch. Adjust clutch pedal when and as needed.
- ✓ Keep electrical system in good condition—check battery regularly.
- ✓ Keep lost motion out of grader—use adjustments for wear and replace parts worn out.
- ✓ Keep tires inflated to recommended pressure.

*If you need help or advice on any of the above, see your local Adams distributor.*

★ **RIGIDITY** is necessary to accuracy! That's why gun barrels are held rigidly in position by elaborate mountings and supports—just as the blades of Adams Motor Graders are rigidly supported in all cutting positions . . . Stout design and costly, machine-finished construction shut out sloppy, inaccurate blade action. That's why experienced operators prefer an Adams when smooth, accurate cutting is necessary to meet strict grading specifications . . . **RIGIDITY** is another of the many features you'll like in Adams Motor Graders when Victory permits you again to buy equipment for peace-time projects!

**J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA**

*Adams motor graders, leveling wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.*

# Adams

**ROAD-BUILDING AND  
EARTH-MOVING EQUIPMENT**

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A-20-A  
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Beth



# Springboard for Airpower



Just strips of steel 18 inches wide by 10 feet long, punched full of holes and made so that when you lay them down side by side, they lock together.

But assemble some thousands of these strips and you have a potent weapon—a military runway. Runways made in this way are serving as springboards from which Flying Fortresses, Grumman Wildcats and A-20-A's are being launched against the Japanese north of Guadalcanal, and against the Nazis in North Africa.

Bethlehem's main job in the

landing mat program is supplying a tremendous tonnage of sheet steel to many fabricators for processing into these mats. Monthly production has been growing fast, and has already reached a figure that might mean something to an enemy advertiser, so we can't quote. But when you realize that just one military runway eats up 3,000,000 pounds of sheet steel, you get an idea of the magnitude of the program. Supplying steel for landing mats is only one of the many ways in which Bethlehem is working to aid our armed forces.

Due to the great need for landing mats in a hurry, Bethlehem Steel Company has converted a portion of its building specialty department to the production of these mats for the duration of the emergency.



ROADS AND STREETS, May, 1943

# ROADS AND STREETS

Vol. 86, No. 5

May, 1943



*A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.*

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD  
ROADS MAGAZINE AND ENGINEERING & CONTRACTING

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ROADS AND STREETS, May, 1943

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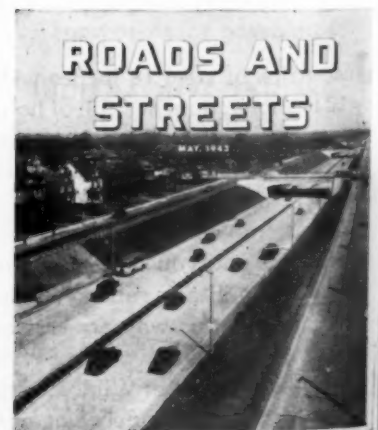
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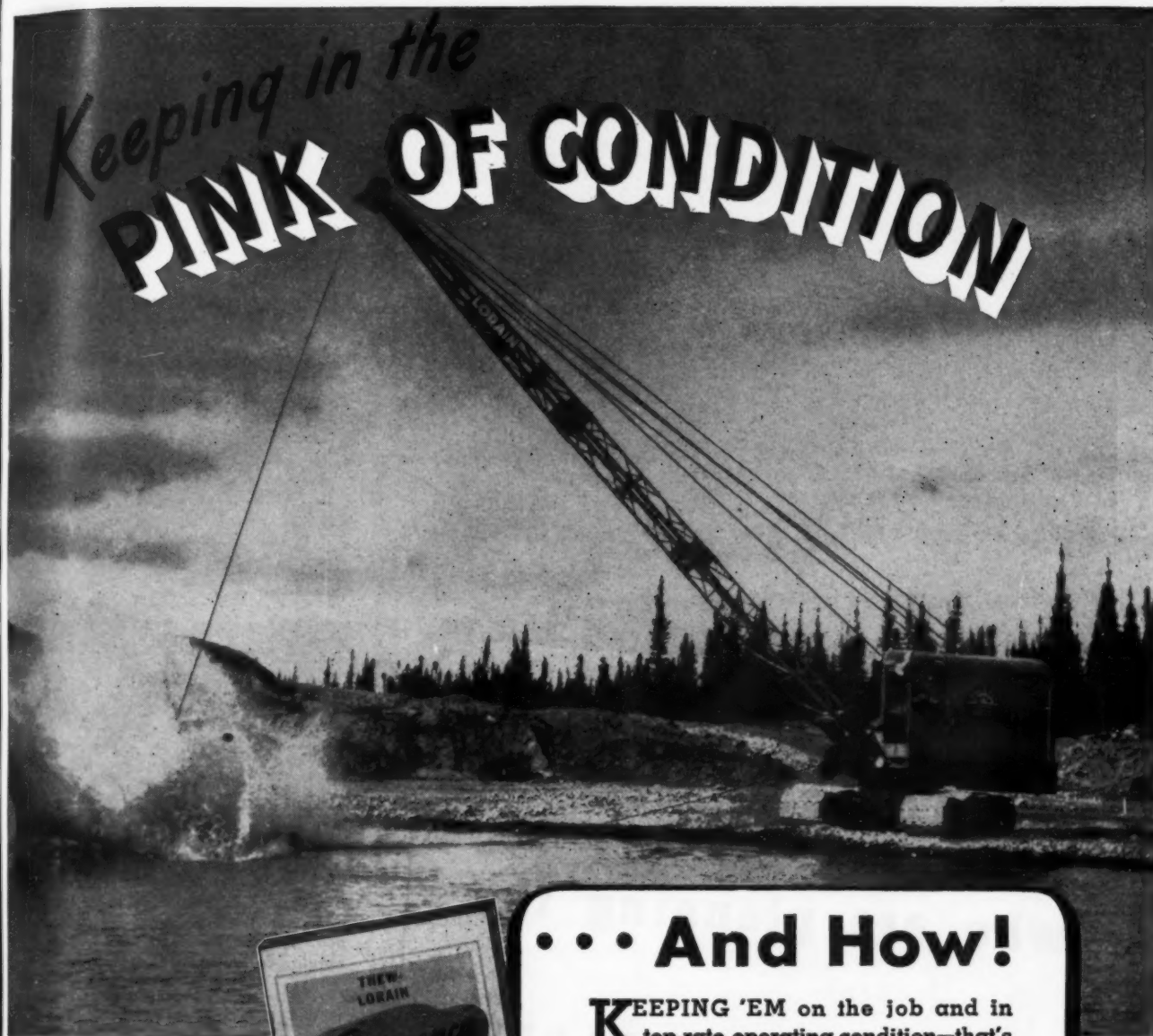
DON HARWAY & CO.  
816 West Fifth St., Los Angeles, Calif.  
Telephone: Mutual 8512



The Davison Highway, shown on this month's cover, is a limited-way cross-town traffic relief project of inestimable value in speeding Detroit's war effort



# Keeping in the PINK OF CONDITION



## ... And How!

**K**EEPING 'EM on the job and in top-rate operating condition—that's the purpose of this new 24-page handbook for Lorain owners and operators. It tells you how to renovate worn parts so they can be re-used efficiently; how to substitute for critical materials when making emergency repairs; how to do more with what you've got.

Hundreds of operators have found that the Fix-It Handbook can save them time, trouble and money. If you haven't received a copy, clip and mail the coupon below.

# THEW. LORAIN

CRANES • SHOVELS

DRAGLINES • MOTO-CRANES

**THE THEW SHOVEL CO., Lorain, Ohio**

Please send me a copy of the Thew Fix-It Handbook. If you would also like to receive a colorful, 5" red, white and blue Conservation Emblem for shovel, crane, tractor, bulldozer or truck, check here. \_\_\_\_\_



Signed \_\_\_\_\_

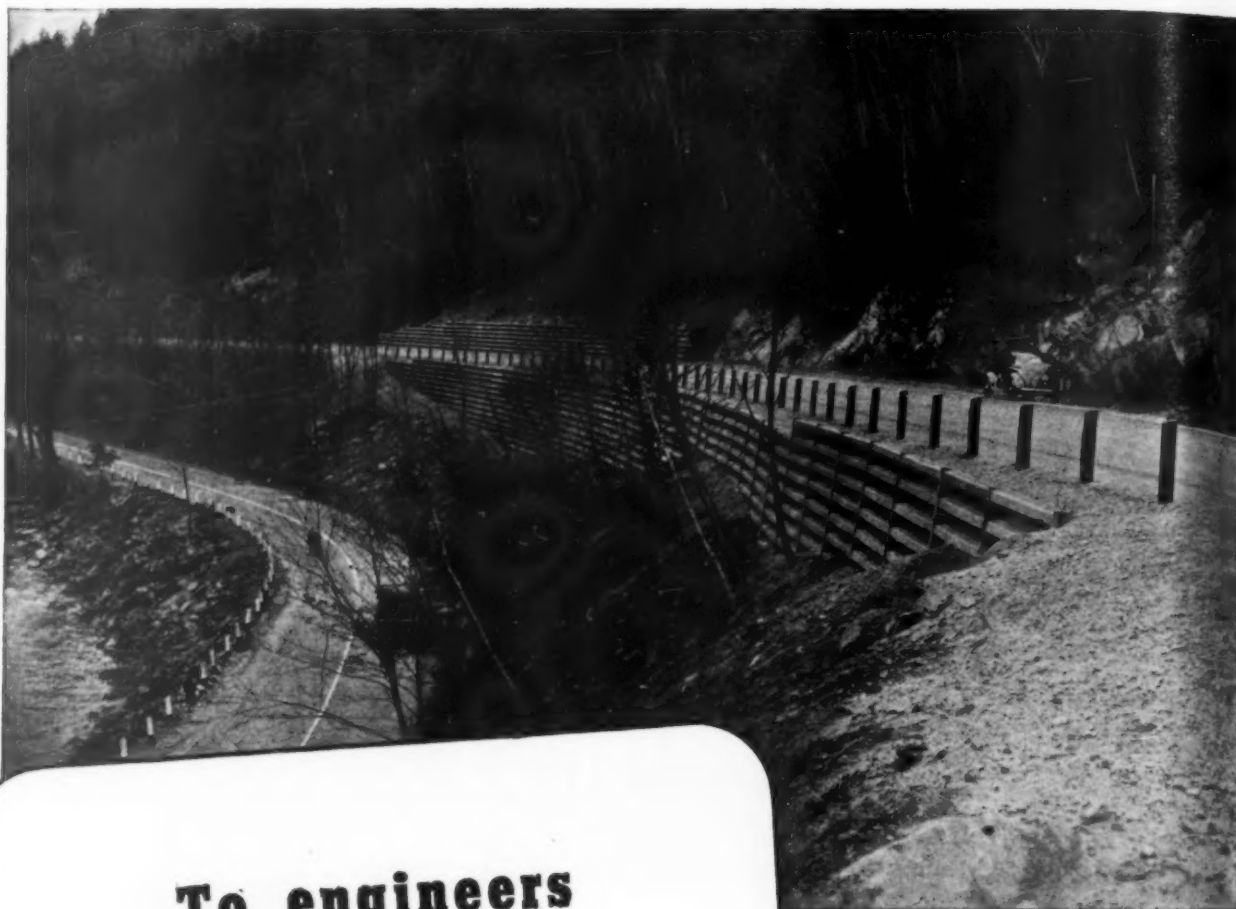
Lorain Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_



**To engineers  
who are planning the  
"BATTLE OF PEACE"**

America will need your plans. Millions of fighting men and other millions of war workers must some day turn to new jobs in a new and different world. You can help by planning now to avert a serious let-down when Victory is won.

No doubt you are thinking about many projects that would not only

improve roads and streets, but even more important would provide jobs for returning service men and workers now in war industries. Even now industry is planning post-war developments to absorb its share of these people. If federal, state and municipal governments have their plans ready, unemployment will

*A divided four-lane highway replaces this once narrow state route. Rugged Armco Bin-Type Walls stabilize the right-of-way, which is so steep in places that the two pairs of lanes are separated by elevations ranging to almost seventy feet.*

★ ★ ★

be less of a problem to America.

In this "board work" you may need a practical solution for unstable slopes, rights-of-way and similar problems. Remember ARMCO Bin-Type Walls for their ability to overcome unequal settlement without cracking or bulging.

So include ARMCO Walls in your plans for the future even though you can't get them for immediate construction. Right now tanks, guns and ships are most important. Armco Drainage Products Association, 365 Curtis St., Middletown, O.

**ARMCO**



**Bin-Type RETAINING WALLS**





## Direct Down-Pressure on the Axis!

The exclusive direct lift and down-pressure of the blade on Baker Hydraulic Bulldozers and Graders is a pain in the neck to Axis chest thumpers.

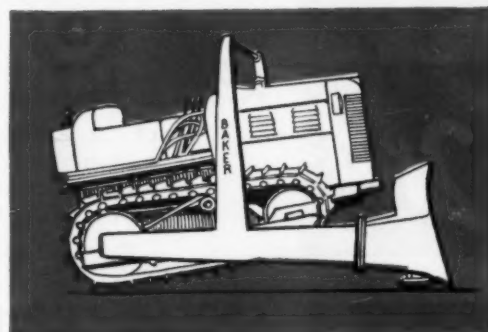
This simple, positive method of control permits the entire weight of the tractor front end to be exerted on the blade—the blade does not depend on its weight alone to force it into the ground. That's why Bakers get out bigger loads faster, every trip, all through each shift.

Their ruggedness and simplicity cuts maintenance costs to the bone. Their design makes the tractor engine more accessible. And they have all of the other features—moldboard level on rough ground, quick interchangeability of moldboards, tractor back end available for winch, etc. that you want in a bulldozer.

Beside rushing camps, landing fields and war plant sites to completion, Bakers are making landing strips in dense jungles and on desert sands, clearing debris from bombed cities, extending military roads in the frozen North and bringing direct down-pressure to bear on foes of democracy in other ways.

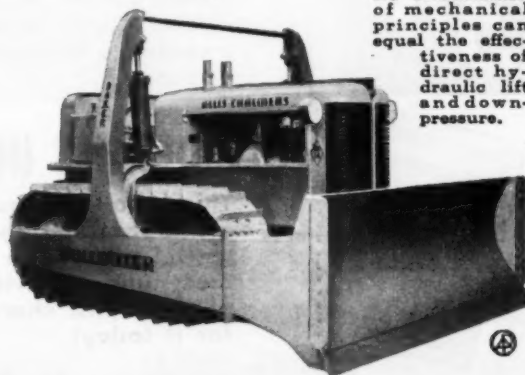
### THE BAKER MANUFACTURING CO.

506 Stanford Avenue Springfield, Illinois



Baker Hydraulic Bulldozers really bear down!

No combination of mechanical principles can equal the effectiveness of direct hydraulic lift and down-pressure.



# BAKER

The Modern Tractor Equipment Line  
for  
EARTH MOVING  
LEVELING AND GRADE BUILDING  
SNOW REMOVAL  
ROAD MAINTENANCE

# HOW TO MAINTAIN ROADS FOR WARTIME TRAFFIC With Calcium Chloride

## 1st

### TREAT ONLY NECESSARY ROADS

Gravel roads that are primarily used for peace-time tourist traffic are off the list this year. But those that carry farm produce to market, war workers to their jobs, and materials to the production lines are more vital than ever and must give smooth, safe, all-weather service.

## 2nd

### APPLY EARLY IN SEASON

Since the binding action of calcium chloride is due to moisture retention, it is common sense to apply the material while natural moisture from spring rains is still in the road. This early treatment increases the effectiveness of calcium chloride and stops loss of road materials before it can start.

## 3rd

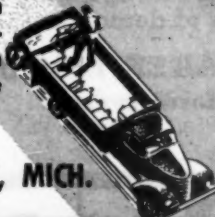
### SPREAD ENOUGH TO BE EFFECTIVE

The soil composition of the road, its location, and the prevailing humidities should govern the number of applications and the total quantity of calcium chloride applied during any given season. The best rule is to make the treatments whenever signs of dryness or disintegration appear in the road surface.



### FULL DETAILS IN BULLETIN NO. 29

This up-to-the-minute manual contains 62 pages of information that will help you maintain gravel roads with a minimum of labor, equipment and materials. Highly illustrated with photographs, charts and useful tables. Write for it today!



CALCIUM CHLORIDE ASSOCIATION, 4145 PENOBSCOT BLDG., DETROIT, MICH.





## WE'RE GIVING OUR BOYS A FIGHTING CHANCE

The men and women of MARION are taking this war seriously. They are giving everything they've got to building MARIONS for war work at home and behind the world's many fighting fronts. They are keeping cranes rolling off the assembly lines so that more ships can be built and loaded. They have earned the coveted Maritime Award and Victory flag. They are investing 10 per cent and more of their pay checks in war bonds month after month. This is how the men and women of MARION are helping to win this war for they, too, have sons, brothers and husbands in the Armed Services to whom they owe a fighting chance. » »

THE MARION STEAM SHOVEL COMPANY, Marion, Ohio, U. S. A.



# MARION

SHOVELS • DRAGLINES • CLAMSHELLS  
CRANES • PORTAL CRANES • WALKERS

WORKING FOR VICTORY: DIGGING — Coal • Magnesium  
Iron Ore • Copper Ore • Bauxite • Manganese • Nickel  
Molybdenum • Sand & Gravel • Clay

MATERIAL HANDLING — Shipbuilding and Cargo Loading  
BUILDING — Airports, Ordnance Plants, Arsenals, Army  
Camps, Marine Bases, etc.

# Waging a

# GLOBAL WAR



... IS AN IMMENSE TASK, but fortunately tools that contribute to our convenience, comfort, and safety during peace, can be used to stamp out aggression. Take rollers like these, which for decades have seen service on every continent of the globe. They've had plenty of preliminary training in wild jungles, desert areas, up in the mountains and where it is cold. They've served where road building techniques vary and where materials of every description were handled in stride. When war was declared, they were "seasoned and ready"—now they are busy on the

"routes to Berlin and Tokio". . . . After victory, we will again have ready for our regular customers the most practical and finest operating units available. Then, owners of our equipment will receive the best possible attention. Austin-Western's DISTRIBUTORS throught the United States and in other countries, are maintaining facilities and a stock of parts to give prompt and efficient service *whenever and wherever is needed*. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois, U.S.A. Distributors in Principal Cities. Cable Address: AWCO, Aurora.

The Cadet is furnished in 6, 7 and 8-ton sizes.



The Autocrat comes in 10 and 12-ton weights.



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# WAR...

victory, w  
customers th  
available. To  
give the be  
TRIBUTOR  
countries, or  
arts to giv  
wherever  
MACHINER  
in Princip

Variable-Weight Tan-  
dem equipped with dual  
controls so the operator  
can work on either side.

The Austin-Western  
Tandem is furnished in  
two sizes: 5 to 8 tons  
and 8 to 10½ tons.

BUILDERS OF

ROAD MACHINERY

# Austin Western

SINCE

1859



Austin-Western also builds Power Graders, Shovels and Cranes, Street Sweepers and a complete line of Rock Crushing and Screening Plants and kindred equipment.



Street before abandoned rails were turned into war scrap.

Same street after tracks were removed and area repaved with concrete.



## Concrete for Salvaging Abandoned Car Track Areas

**A**LL over the country abandoned street car rails are being salvaged for war needs.

An important by-product of the salvaging of steel rails is the increased street traffic capacity gained by restoring the track area to usefulness.

Removing steel rails and paving with concrete not only gives additional capacity for buses or trackless trolleys but improves the appearance of the street and gives increased safety. And returns from the sale of the rails will pay a part of the cost of repaving.

Eight-page illustrated information sheet, "Concrete Pavement for Abandoned Car Track Areas," gives recommended designs to fit varying weights and volumes of traffic. Will be mailed on request to engineers and officials of any community planning to aid the war effort with a track salvaging project.



**PORTLAND CEMENT ASSOCIATION**  
Dept. A5-28, 33 W. Grand Ave., Chicago, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

**BUY MORE WAR SAVINGS BONDS**

# Beating Schedules on the Ground ...to beat the Axis in the air!



## ...with Buckeye Spreaders

**T**HE speed and accuracy of Buckeye Spreaders has helped surface many a runway at schedule-beating pace, extending the network of training, fighting and transport fields that will soon add up to overwhelming air superiority over the Axis.

Fast, accurate and versatile, Buckeye Spreaders deliver the most out of every precious hour, out of every yard of costly, hard-to-get mate-

rial... facts that mean speed and efficiency on essential airport construction and maintenance jobs. Write or wire for complete information.

**The Buckeye Traction Ditcher Co.**

Findlay • Ohio

*PHOTO—Buckeye Spreader laying a chip course over oil base at one of Pan-American's new bases "out yonder".*



# Built by Buckeye

Convertible Shovels



Trenchers



Tractor Equipment



R-S Finegraders



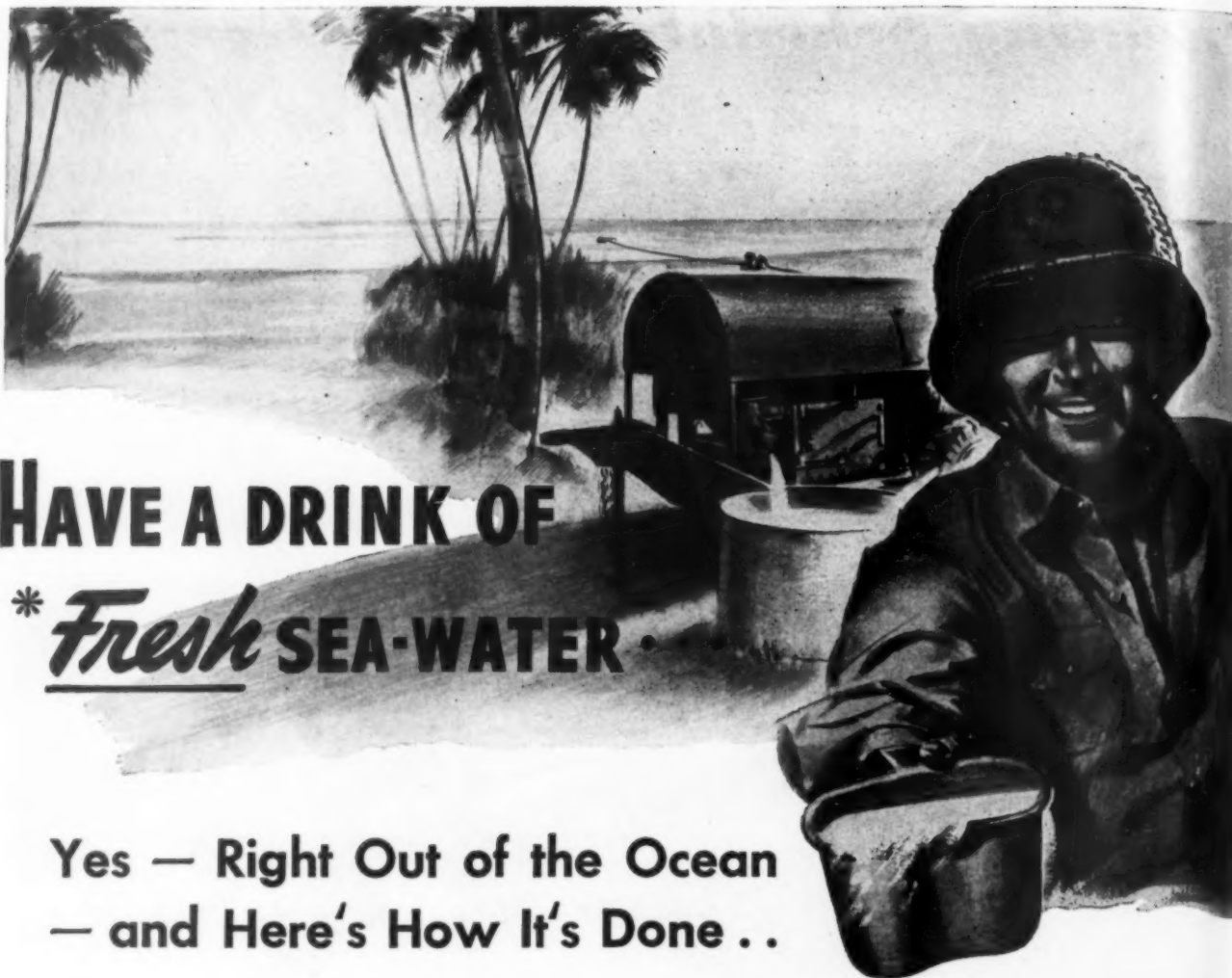
Road Wideners



Spreaders







## HAVE A DRINK OF \* *Fresh* SEA-WATER.

Yes — Right Out of the Ocean  
— and Here's How It's Done ..

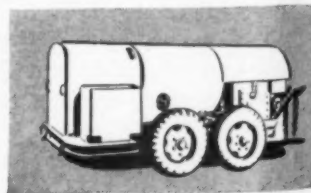
\*COMMON salt sea water is converted into safe, crystal-clear, distilled water — for drinking, cooking, and other purposes—by Cleaver-Brooks distilling units. Engineers of the Army, the Navy, and the Marine Corps roll these portable units to forward areas for a dependable source of drinking water supply. Enough of them are already in service to produce millions of gallons of distilled water daily — water so chemically pure it is used for submarine storage batteries.

Other types of Cleaver-Brooks equipment which guard the health and welfare of fighting men are mobile disinfecting and sterilizing equipment—portable show-

er bath units. All of this equipment makes effective use of the Cleaver-Brooks multi-pass down-draft heating principle first made famous in Cleaver-Brooks tank car heaters, bituminous boosters, and steam generators.

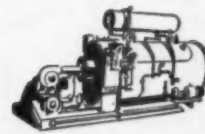
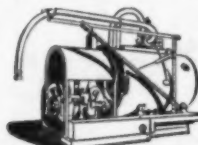
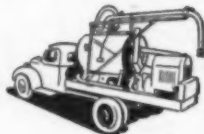
Cleaver-Brooks production right now is going 'round the clock for military needs, but we are glad to send complete information on tank car heaters, bituminous boosters, automatic steam plants — for your future needs.

CLEAVER-BROOKS COMPANY  
5106 N. 33rd Street  
Milwaukee, Wis. U. S. A.



# Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS



*To Earthmovers  
Planning to Use  
Fast-Moving Rigs*

# Tournapulls Can Lower Your Yardage Costs



## More Than 800 Now Cutting Costs in 43 States and 13 Foreign Countries ... They Can Do the Same For You

### Save on Rigs and Manpower

When you use Tournapulls you begin your savings by requiring less equipment and fewer men. No big, expensive loading unit needed. One pusher tractor easily handles pusher loading of 3 to 4 Tournapulls, depending on length of haul. What's more Tournapulls spread their own loads on the move, require no investment in special spreading tools, add substantially to compaction, too. Finally, because Tournapulls are

fast-moving and have big capacity, you get greater production with fewer units and consequently with fewer men.

### Job Proved by 5 Years Use

Today's Tournapull design is based on more than 5 years of job proof on some of the world's largest and toughest earthmoving projects. 800 are now in use by over 100 successful earthmovers—most of them fleet users—in the U.S. and 13 foreign countries.

Made in sizes from 45 to 400 H.P. for Carryall Scrapers from 2.2 to 59 heaped yards capacity.



*You get big loads, like this in 60 to 90 seconds, with a Super C, have plenty of surplus rimpull to accelerate up to 14.3 M.P.H. quickly and to pull through tough spots without delays.*

### Backed by World's Best Dealer Service

Tournapulls are stoutly constructed to cut lost time to a minimum. The best of equipment, though, requires repair occasionally. Then you'll find quick, expert service available from 182 LeTourneau—"Caterpillar" dealers and branches in the U. S.

No other fast earthmoving rig today offers you: (1) so much yardage so quickly and cheaply, (2) job-proved assurance of profit, (3) quick service everywhere. Ask your LeTourneau—"Caterpillar" dealer about Tournapulls—a few are available for high priority projects.

### OPERATION SIMPLE

Tournapulls are easy to operate. They shift like a truck, steer like a track-type tractor. Power Control Unit for controlling Carryall Scraper loading and spreading is same as that job-proved on thousands of tractor-scraper outfits. Powerful, sure-acting brakes on both Tournapull and Carryall assure quick stopping and complete control on grades.

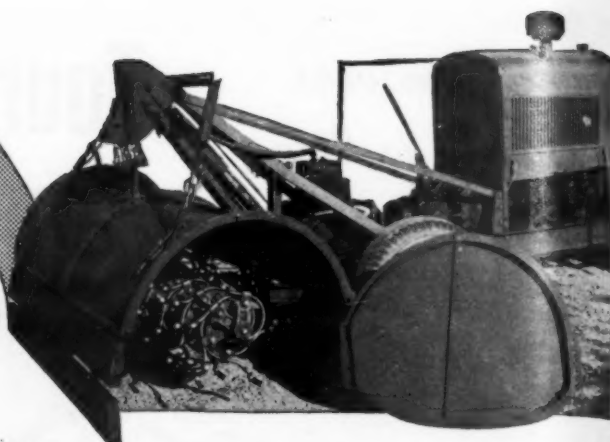
*(Left) Tournapulls spread their own loads on the move, do away with need for special spreading tools. Same time, large pneumatic tires enable them to cross existing highways without pavement injury. Model shown is standard C, 11 heaped yards capacity.*

*For building*  
**BETTER HIGHWAYS**  
*to the SKYWAYS*

# ROTOTILLER

TRADE MARK REG. U.S. PAT. OFF

## ROADMAKER



**SOIL STABILIZATION** is speeding military operations wherever our armed forces are or go. Using local materials or any others available, highways, landing strips and airfields can be built or repaired faster, better, more economically.

ROTOTILLER Roadmaker is the pioneer "3-in-1 Rotary Action Machine" especially designed and built for soil-cement and soil stabilization work. The "3-in-1 Rotary Action" assures more accurate control in both wet and dry mixing operations as well as more thorough pulverization of materials. The fast-revolving, self-sharpening tines thoroughly mill the earth from top to bottom to a depth of 12 to 18 inches in one operation.

GET THE FACTS on this 1943 job-tested ROTOTILLER Roadmaker. Write for descriptive literature.

**ROTOTILLER, Inc.**  
 Dept. P TROY, N. Y.



ABOVE: Mixing clay and sand to depth of 12 to 14 inches on experimental project for U. S. Naval Construction Battalions (Seabees). Note fine pulverization and uniformity of mix.

LEFT: Scarifying to rebuild old road.

RIGHT: ROTOTILLER Roadmaker takes sharp turns with safety without taking tines from ground or stopping tillage unit.

### 7 STAR FEATURES

1. Improved, self-sharpening, single unit spring-tines.
2. 4-speed transmission permits use for scarifying as well as mixing.
3. Flexible tilling unit gives fast, easy operation; sharp turns with safety.
4. Weight of tilling unit variable to suit conditions; lessens wear.
5. Depth of operation regulated to within one-half inch.
6. Powerful 6-cylinder Chrysler motor operates economically on 1 to 2½ gallons of gasoline per hour, depending on conditions.
7. Strong, dependable ROTOTILLER Roadmaker cuts 6 ft. wide, 12 to 18 inches deep, with complete ROTOTILLAGE across entire width of cut — no untillaged areas.

Post war plans undoubtedly will call for thousands of miles of soil-cement and oil stabilized secondary roads. Returning soldiers will find economic security in this work. Then, as now, ROTOTILLER Roadmaker will serve faithfully and well.





# Building War Birds Nests

CARL E. NELSON, Logan, Utah  
delivers over  
**100,000 TONS**  
of Blacktop for the  
War Effort in less  
than Six Months!

# on Time!

WITH the enemy battering at the door, the whole nation is watching output. High averages are the index to production for Victory. Ninety to one hundred tons an hour average for blacktop production means nests for war birds in a hurry, and it's the best possible evidence of the trouble-free service that Cedarapids Asphalt plants give. That's the daily average of Carl E. Nelson of Logan, Utah with one Cedarapids Asphalt plant on four jobs and in spite of three moves, from widely divergent points.

Iowa Cedarapids plants are simple in design. They are compact, easily moved — even to the Great Model E plant, the largest fully portable plant built today — they get on the job and are producing in a hurry! When you buy a Cedarapids, you are buying an asphalt factory engineered to your particular problem from proved units and tested by some of the leading producers of the country.

Wartime performance can teach much for peacetime operation. The advantages that Cedarapids equipment brings for getting the war jobs done will help you meet competition after the "duration."

*It's time to learn about  
Cedarapids equipment!*



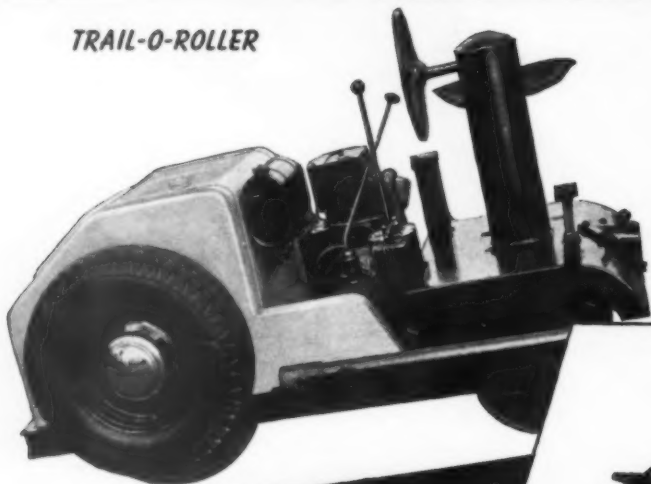
# Cedarapids

MANUFACTURING CO.

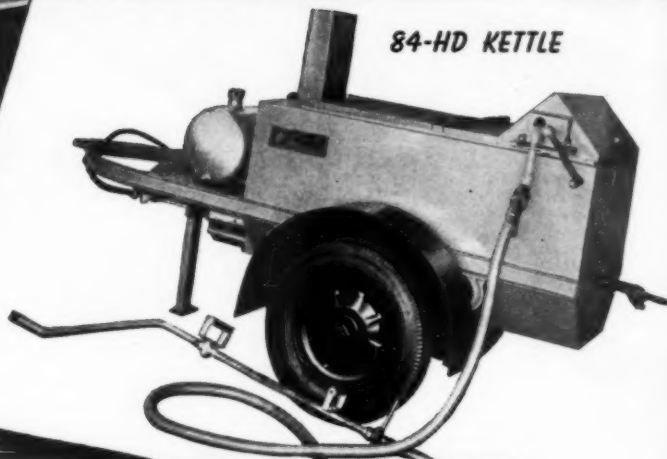
Built by  
IOWA

Cedar Rapids, Ia.

TRAIL-O-ROLLER

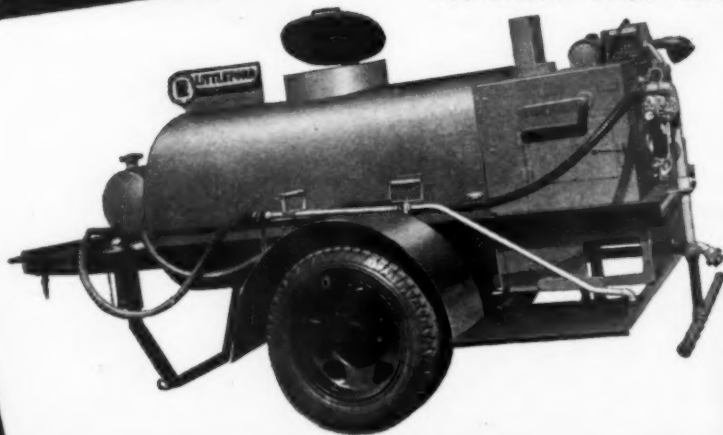


84-HD KETTLE



LITTLEFORD

101 UTILITY SPRAY TANK

TORCH TYPE  
OIL BURNER

## BLACK TOP ROAD MAINTENANCE EQUIPMENT

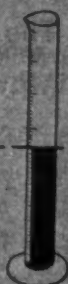
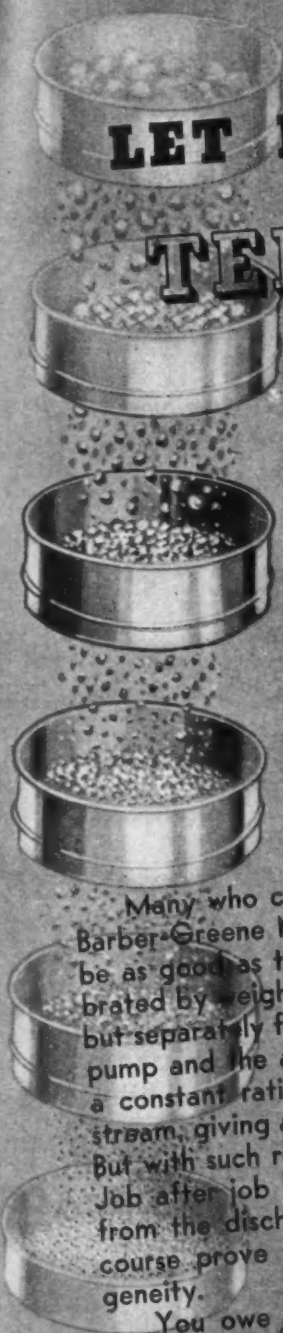
The Littleford Trade Mark is in the fight, building and maintaining Airports, Highways, Roads, Barracks and Cantonments. Doing a job to help bring an early peace. After Victory, the Littleford "Trade Mark" will

again help to make this world a better place in which to live. Littleford, since 1900, has produced Black Top Construction and Maintenance Equipment, and is NOW proud to have the chance to produce for Victory.

**LITTLEFORD BROS., INC., 454 E. Pearl St., CINCINNATI, OHIO**



# LET EXTRACTION TESTS TELL THE STORY

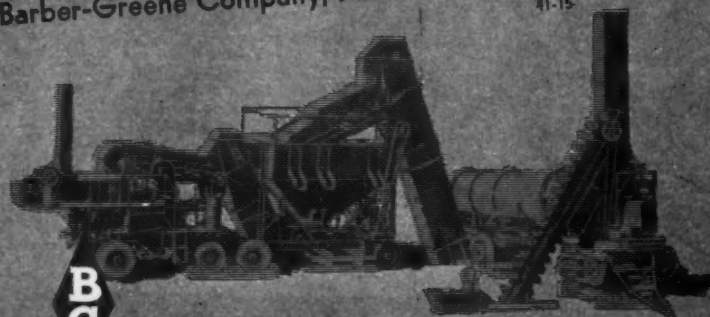


ACCURATE GRADATION  
ACCURATE PROPORTIONING  
THOROUGH MIXING  
CONSISTENT PERFORMANCE  
SIMPLE INSPECTION

Many who completely understand the fundamental principles of the Barber-Greene Mixer logically wonder if it is possible for the results to be as good as the theory. They know that the aggregate feeder is calibrated by weight, on the job; that each size of aggregate is continuously, but separately fed into the pugmill. They know that the bitumen metering pump and the aggregate feeder are mechanically interlocked to deliver a constant ratio, and that the materials are fed in a small continuous stream, giving a practically uniform distribution at the start of the mixing. But with such revolutionary advantages they want to see the final proof. Job after job has produced this proof. Laboratory analyses of samples from the discharge of the pugmill, and core samples from the finished course prove the highest accuracy of proportioning, the finest homogeneity.

You owe yourself a complete understanding of the principles and results of what is truly TOMORROW'S MIXER TODAY. Write for literature, there is no obligation. Barber-Greene Company, Aurora, Illinois.

41-15



B  
G

# BARBER GREENE

ROADS AND STREETS, May, 1943



## CLEVELAND CLAY AND TRENCH DIGGERS

*Take it Out in a Hurry!*

Model CD8  
Weight, 22  
Pounds



★ For loosening up hard ground or tough clay, these tools are real time and money savers. There are four types to choose from—a good digger for every condition. Model CD8 is recommended for average work, for caisson jobs, wall trimming, and similar digging. The TD8, with the extension handle, is just right when the operator has a chance to stand erect in his work. C10D, with the spade handle, and the C10E long-handle digger, are for the tougher job.

Model TD8  
26 Pounds



Model C10E  
36 Pounds

Model C10D  
29 Pounds

## CLEVELAND BACKFILL TAMPERS

*Ram all the Dirt Back Firmly!*



Cleveland No. 5 Back Fill  
Tamper weighs 30 lbs.  
with butt.

★ Whenever construction work or paving must proceed immediately after back-filling, Cleveland Tampers will prove to be the answer to your problem. They ram the earth even firmer than it was originally, making it safe for your job to go ahead. And you won't have any dirt to haul away!

*Bulletin 128 provides full information on the Cleveland Line of Diggers and Tampers. Promptly sent on request.*

### BRANCH OFFICES

|                  |                  |                     |                      |
|------------------|------------------|---------------------|----------------------|
| Birmingham, Ala. | Cincinnati, Ohio | Lexington, Ky.      | Richmond, Va.        |
| Berkeley, Calif. | Dallas, Texas    | Los Angeles, Calif. | Salt Lake City, Utah |
| Boston, Mass.    | Detroit, Mich.   | Milwaukee, Wis.     | St. Louis, Mo.       |
| Buffalo, N. Y.   | El Paso, Texas   | New York, N. Y.     | Victor, Colo.        |
| Butte, Mont.     | Ironwood, Mich.  | Philadelphia, Pa.   | Wallace, Idaho       |
| Chicago, Ill.    | Knoxville, Tenn. | Pittsburgh, Pa.     | Washington, D. C.    |

### CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.  
Whitehall Machine & Tools, Ltd., Galt, Ontario

*Cleveland Rock Drill Factory People are buying regularly U. S. War Bonds and Stamps.*

# THE CLEVELAND ROCK DRILL COMPANY

*Subsidiary of The Cleveland Pneumatic Tool Co.*

CLEVELAND, OHIO

# THERMOMETER HITS BOTTOM

## -but Airports must be built!

THE miracle of modern machinery is a continuous thing. Time was when the laying of concrete slab at 8°F was one of those things that couldn't be done. But military necessity found a way and a new airport is being completed in spite of the guns of "Old Man Winter."

Man and machine take a real beating in weather like this. The tugging of the intense cold against the high temperatures of the heating equipment impose strains for which road machinery is not built.

But this is just one of the things that MultiFoote Pavers are doing that they never had to do before — one of the many things on which MultiFoote Pavers are proving their metal.

These are the things to remember after the "Education." Then the smooth operation; the many MultiFoote advantages; the flexibility made possible by the use of elevated booms; the speed and ease of handling, will mean profitable post-war contracts. We will be glad to give you complete details to aid in planning for the future.

**THE FOOTE COMPANY, INC.** Nunda, New York

*The World's Largest Exclusive  
Manufacturers of Concrete  
and Black Top Pavers.*

# MULTIFOOTE

## CONCRETE PAVERS

... ADNUN BLACK TOP PAVERS



# The SEAMAN PULVI MIXER

gives the contractor  
greater uniformity and  
thoroughness of mix  
and cuts costs  
40% - 50% "

MR. C. F. BARNETT of the  
Barnett Machinery Company,  
Lake Dallas, Texas.



The State of Texas has been the scene of a great many large soil-cement stabilization jobs,—and Mr. Barnett's observations of the economy and quality of the work of the SEAMAN MIXER, carry authority.

What Mr. Barnett says of the elimination of water migration by the use of the SEAMAN applies equally to any fluid binder. And in all in-place mixing operations in the various soil stabilization processes, the SEAMAN MIXER combines in one operation the functional processes which have in the past required laborious, uncertain and time consuming work with soil tillage tools.

For all in-place mixing operations  
... it's the SEAMAN!

**SEAMAN MOTORS**  
Manufacturers of the SEAMAN MIXER  
AND THE SEAMAN PULVI-MILL  
MILWAUKEE, WISCONSIN

## Barnett Machinery Company

Bus. Phone 43 • LAKE DALLAS, TEXAS • Res. Phone Taylor 4360

March 24, 1943

Seaman Motors  
305 N. 25th Street  
Milwaukee, Wisconsin

Gentlemen:

We have had the opportunity on a number of occasions to check the work of the SEAMAN PULVI-MIXER in soil stabilization construction in this area.

The economy obtained by the SEAMAN is outstanding in comparison with the costs that prevailed before the PULVI-MIXER was introduced. I would say that, in most operations, the SEAMAN has cut from 40% to 50%.

In soil-cement construction, the SEAMAN PULVI-MIXER gives the contractor much closer control of mixture, a greater uniformity and thoroughness of mix through the full depth of treatment. This also applies to the control of water-application in soil-cement stabilization. Water migration and consequent soft spots are entirely eliminated, for with the PULVI-MIXER, a thorough mixture can be obtained as rapidly as moisture is applied. Further SEAMAN PULVI-MIXERS will harvest approximately 50% more Bermuda grass per acre than other methods known to us and will reduce the cost in harvesting Bermuda grass approximately 75%.

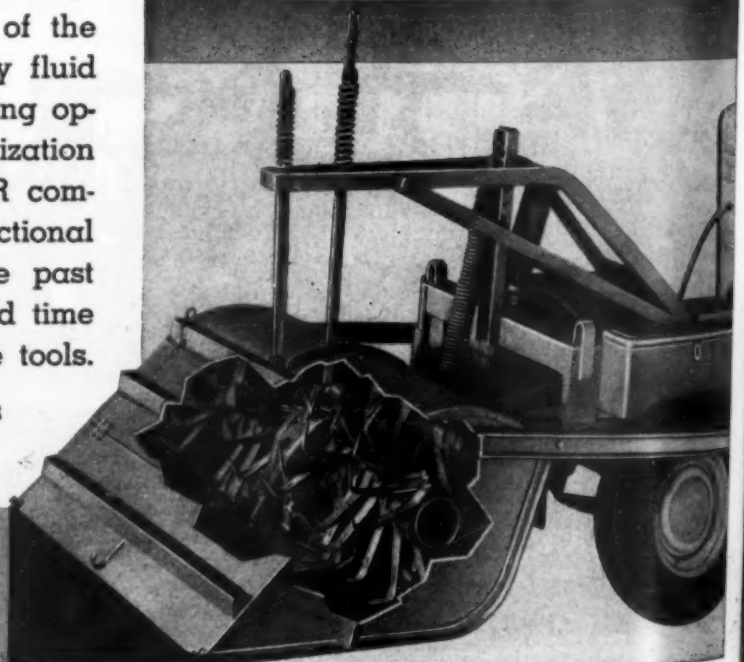
Yours very truly

BARNETT MACHINERY COMPANY

By- *C. F. Barnett*

SEAMAN MIXERS & PULVERIZERS  
Concrete, Sand, Clay, Aggregate and other Stabilizing Materials

Cutaway view of the mixing chamber showing the arrangement of the tines. SEAMAN MIXER MHD 72. (Motorized)





# "KNOW-HOW" BUILDS BUCKETS

## AND KEEPS THEM DIGGING

Back of every Blaw-Knox Bucket in the field there is a card record at the factory which bears the history of the bucket throughout its life.

A review of the card records representing thousands of Blaw-Knox Clamshell Buckets furnished to contractors for all types of service during the past twenty-seven years, shows that a surprisingly large number of old buckets are still on the job, digging and rehandling material.

There is only one logical conclusion. Clever bucket design, backed up by experience and field service—good, husky construction—the selection and use of proper materials—are the reasons why so many contractors prefer and buy Blaw-Knox Clamshell Buckets.

Contractors can be assured that Blaw-Knox engineering skill and highly developed manufacturing technique will continue to keep Blaw-Knox Buckets—*tops*.

# BLAW-KNOX

**BLAW-KNOX DIVISION  
OF BLAW-KNOX COMPANY**

2003 Farmers Bank Bldg., Pittsburgh, Pa.  
NEW YORK • CHICAGO • PHILADELPHIA  
BIRMINGHAM • WASHINGTON  
Representatives in Principal Cities

★ ★ ★ FOR VICTORY BUY U. S. WAR BONDS AND STAMPS ★ ★ ★



## MORE POWER FOR TANKS TODAY— CHEAPER POWER FOR AMERICA TOMORROW!

**A**MERICA'S tanks pack a powerful push as well as a powerful punch. And more times than most people know, this push comes from a General Motors Diesel engine.

What's more, you'll also find these rugged, hard-working power plants in landing barges, patrol vessels, military trucks, construction tractors and many other wartime jobs where sturdy dependability is required.

They burn cheaper fuel and use less of it—operate with a minimum of attention.

Of course the needs of war

are taking every engine that even our expanded production can make, but when peace comes America will profit—through low-cost power for many new applications.

So while now GM Diesels are adding strength to America's fighting arm, they will be one of the important contributions to better days after victory is ours.



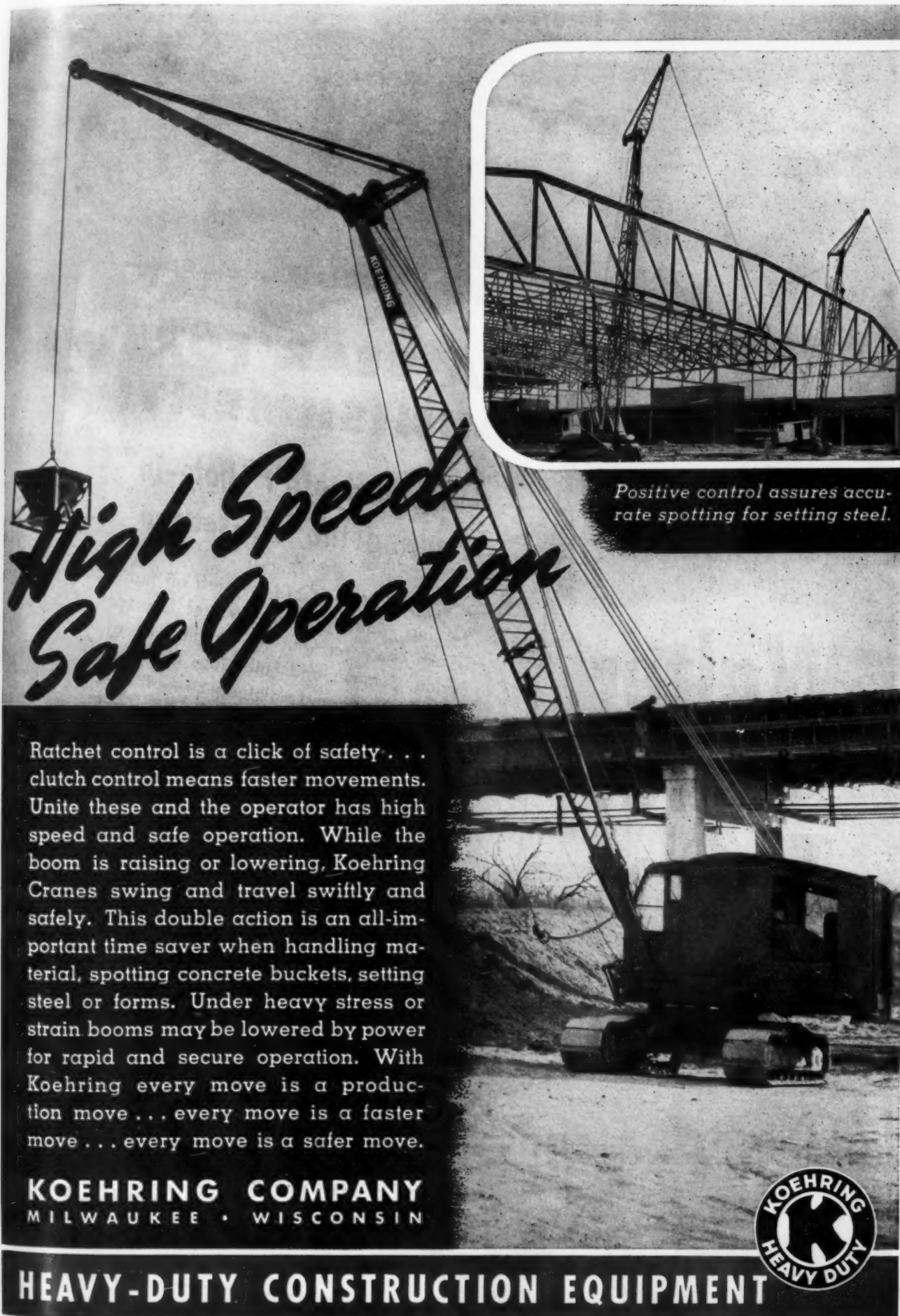
*Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.*



ENGINES... 15 to 250 H.P. ... DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

ENGINES... 150 to 2000 H.P. ... CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

LOCOMOTIVES... ELECTRO-MOTIVE DIVISION, La Grange, Ill.



*High Speed  
Safe Operation*

Positive control assures accurate spotting for setting steel.

Ratchet control is a click of safety . . . clutch control means faster movements. Unite these and the operator has high speed and safe operation. While the boom is raising or lowering, Koehring Cranes swing and travel swiftly and safely. This double action is an all-important time saver when handling material, spotting concrete buckets, setting steel or forms. Under heavy stress or strain booms may be lowered by power for rapid and secure operation. With Koehring every move is a production move . . . every move is a faster move . . . every move is a safer move.

**KOEHRING COMPANY**  
MILWAUKEE • WISCONSIN

**KOEHRING  
HEAVY DUTY**

**HEAVY-DUTY CONSTRUCTION EQUIPMENT**





# Walter Tractor Trucks

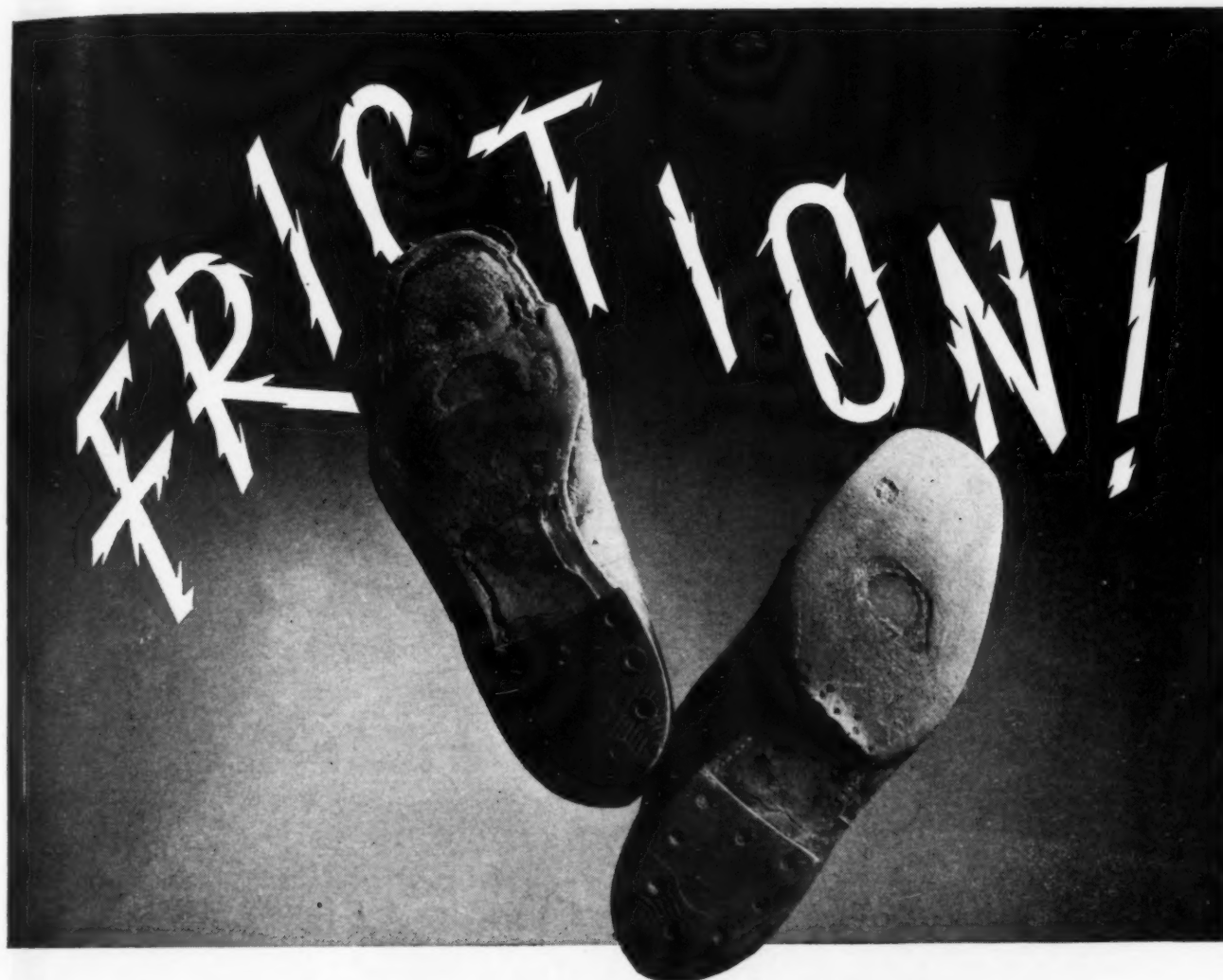
## A BEAR FOR PUNISHMENT!

—and it doesn't "hole-in"  
during the off-season

**C**ONTINUING where they left off fighting winter snows, Walter Tractor Trucks carry on with the tough jobs of Spring, Summer and Fall. Jobs like road building, repair and maintenance—off-the-road work—construction projects—and emergencies, all of which require the unfailing power-plus-traction of Walter 4-Point Positive Drive.

On soft dirt, mud, sand, ruts or stiff grades, the Walter's **FOUR** powerful driving wheels meet the test without bogging down, slipping or stalling. To handle these jobs, where conventional trucks fail or falter, Walter Tractor Trucks embody such features as patented automatic locking differentials, suspended double reduction drive, tractor type transmission and many others. Write for detailed literature.

**WALTER MOTOR TRUCK CO.**  
1001-19 Irving Ave., Ridgewood, Queens, L.I., N.Y.



## REDUCE WEAR AND REMOVE CARBON WITH MACMILLAN RING-FREE MOTOR OIL

Undue motor wear, waste of fuel and excessive carbon have no place in a sound preventive maintenance program. At the same time, "production" must be speeded up. That's why operators simply must pay more than usual attention to motor lubrication ... and motor cleanliness.

Macmillan RING-FREE Motor Oil cuts down waste and wear while speeding up performance, and at the same time, RING-FREE removes carbon!

In 1094 Certified Road Tests, with various makes of owner-driven cars, 10 per cent increases in gasoline mileage were not uncommon after crankcases were drained and refilled with RING-FREE. As indicated by these tests, the average immediate saving was 1.3 miles per gallon! These tests emphasize that RING-FREE lubricates better ... *reduces friction faster*. It delivers direct to the drive shaft more of the horsepower ordinarily wasted in overcoming motor friction. It postpones "down-time" for repairs.

Macmillan RING-FREE Motor Oil combines all these qualities: great film strength, high heat resistance, long cling to metal, fast penetration ... *plus* the fact that it is non-corrosive, is less affected by dilution and it *removes carbon*.

### CARBON REMOVAL A NATURAL RING-FREE FUNCTION

Macmillan RING-FREE Motor Oil actually removes carbon while the motor runs! Hence, by its continued use, pistons, rings,

valves—all vital parts—stay cleaner. Carbon removal is a natural function of RING-FREE, inherent in the crude oil and retained by the exclusive Macmillan patented refining process, *without the use of additives*.

**TO SUM UP:** MACMILLAN RING-FREE gives more horsepower to the drive shaft—tangible saving of fuel—allows less wear on hard-to-replace engine parts—it removes carbon.

### Macmillan Petroleum Corporation

50 W. 50th St., New York • 624 S. Michigan Ave., Chicago • 530 W. Sixth St., Los Angeles

Copyright 1943  
Macmillan Petroleum Corp.

**MACMILLAN  
RING-FREE  
MOTOR OIL**

REDUCES WEAR BY REDUCING FRICTION

ROADS AND STREETS, May, 1943



## THE ENEMY CAN'T HEAR 'EM

His sensitive radio direction finders are constantly listening to detect and locate "signals" from powerful ignition systems. To foil him, we make every piece of equipment "silent" from a radio standpoint. It must pass a rigid test before it is ready to turn over for Army inspector's okay.

Special-purpose trucks involve special problems, sometimes seemingly remote from motor truck manufacturing. Ward LaFrance has the experience and know-how to meet such needs. It has been gained over a period of many years of building specially engineered fire apparatus and other special trucks of many different types.

In postwar replacement, fleet owners should give thought to the advantages of vehicles designed and built for the *exact* job they have to do. Operators of mines, quarries and large construction companies will be interested in the increasing use of special trucks to eliminate heavy

capital investment in mechanical conveyor apparatus. Ward LaFrance engineers offer competent counsel to executives who are already looking forward to such postwar improvements.

### WARD LAFRANCE TRUCK DIVISION



ELMIRA, NEW YORK

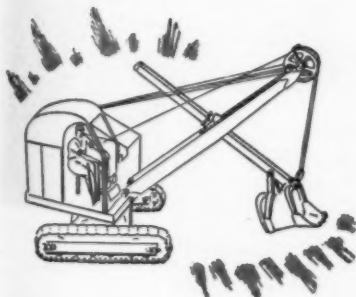
# WARD LAFRANCE





# KEEP YOUR SHOVEL *DIGGING* FOR UNCLE SAM

Good maintenance is especially important today when new equipment is hard to get and existing equipment is called on for high-speed 3-shift service. Here are a few simple rules that may help keep your shovel digging more for longer:



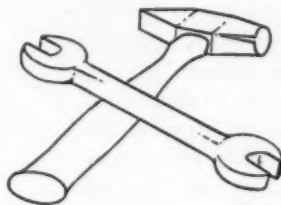
★ Lubricate regularly, following manufacturer's instructions carefully.

★ Keep machine clean.

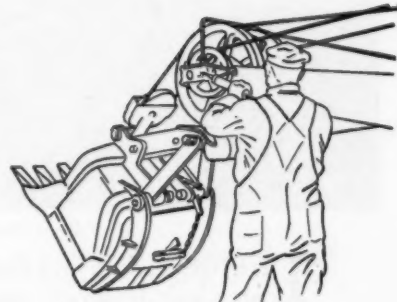
★ Keep fuel, lubricants and radiator water clean.

★ Inspect machine at least every 6 shifts and tighten any loose bolts.

★ Fix troubles while they're still little ones. Don't let them grow.



★ Try to lay out work and drainage so machine works on dry footing.



★ Do not "sweep" the pit by sideways dipper motion.

★ Do not start swing until dipper has been hoisted or retracted clear of bank.

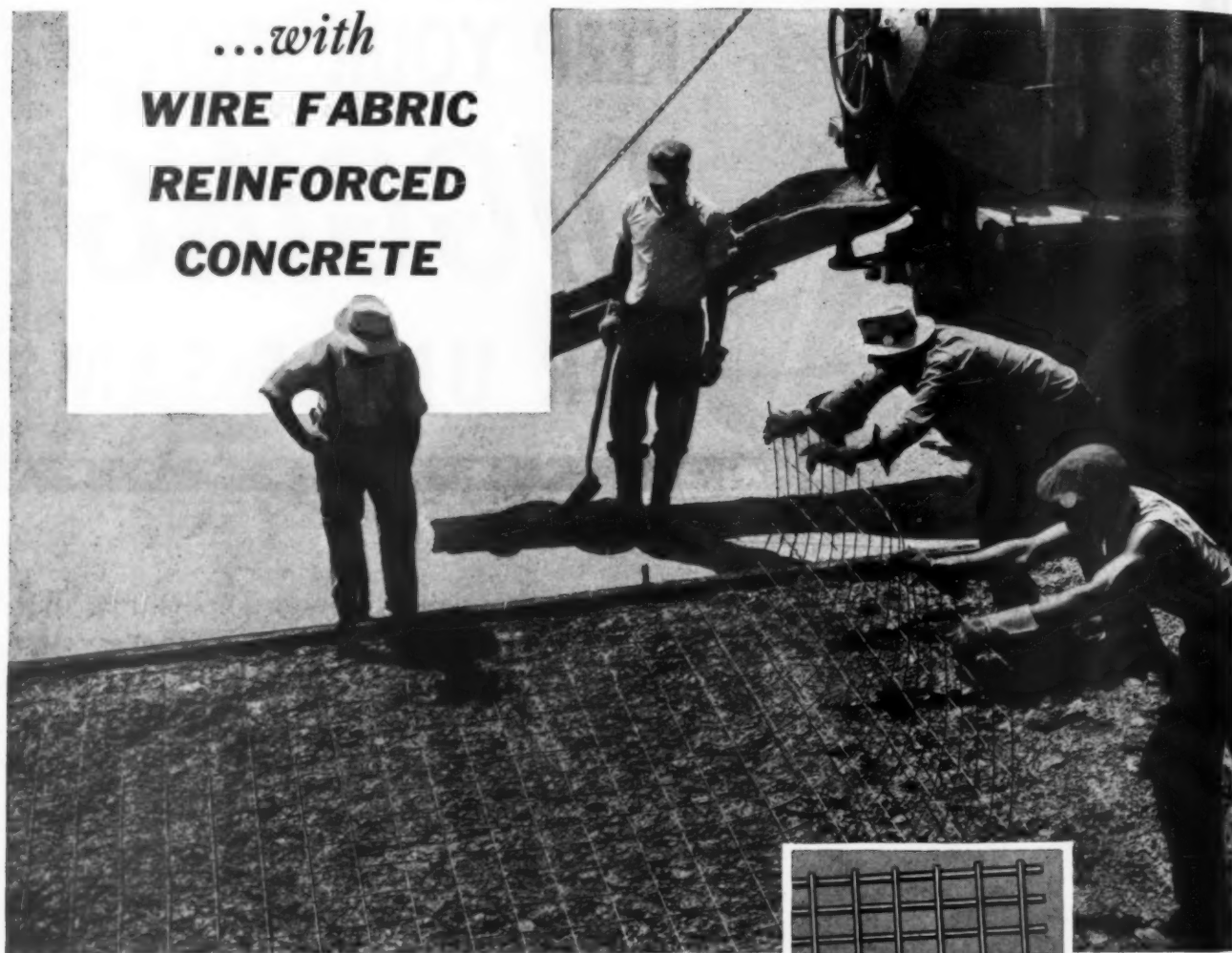
Bucyrus-Erie employees have accepted the award of the Army-Navy "E" as a challenge to keep production rising. \* \*

## Bucyrus-Erie

SOUTH MILWAUKEE • WISCONSIN • U. S. A.

# BETTER HIGHWAYS FOR AMERICA'S FUTURE

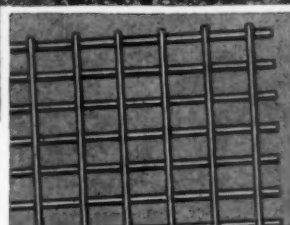
*...with*  
**WIRE FABRIC  
 REINFORCED  
 CONCRETE**



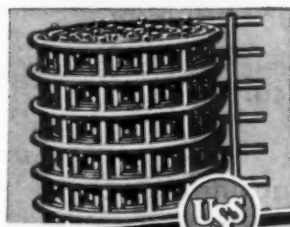
THE tremendous war-time loads that are rolling over America's highways are proving the ability of wire fabric reinforced concrete roads to take terrific punishment. And they are convincing evidence that wire fabric will be a wise choice to preserve the smoothness of roads built for the future—and to protect the investment in them.

There's good reason why wire fabric adds to the useful life of pavements. Cracks that may form are structurally harmless because the closely-spaced, high-yield-point reinforcing steel controls the crack by holding the faces of adjoining slabs formed by the crack in tight interlock. This enables the two crack edges to deflect simultaneously rather than independently, thereby preventing the concrete from becoming overstressed at crack edges.

To safeguard the highways of the future, give them the extra durability of steel. Specify wire fabric reinforcement for concrete construction.



IN SHEETS . . . OR IN ROLLS



**AMERICAN  
 ELECTRIC WELDED  
 WIRE FABRIC**

**AMERICAN STEEL & WIRE COMPANY**

*Cleveland, Chicago and New York*

*Columbia Steel Company, San Francisco, Pacific Coast Distributors  
 United States Steel Export Company, New York*

**UNITED STATES STEEL**

FOR LONG  
PROFITABLE  
EXCAVATOR  
LIFE—

**DON'T FORGET**  
to—

#### CHECK ENGINE LUBRICATING OIL TWICE EACH SHIFT

Oil should be checked after machine is stopped and oil has drained back into oil pan. Add oil if necessary. Oil filters should be drained and filters serviced at intervals prescribed by engine builders. (Engines without filters should be drained every 50 hours). Oil screen in crank case of engine should be examined every month and cleaned if necessary.

#### CHECK OIL IN GEAR CASES EACH WEEK

Oil should be changed when it shows signs of thinning and the body of the oil starts to break down. Do not permit oil to get too low that the gears will not pick up and distribute it. Keep vents in filler cap open to avoid the case leaking.

#### LUBRICATE CRAWLERS AFTER EACH SHIFT

Grease crawler tread rollers every eight hours regardless of distance traveled or every half mile if they are in continuous operation. Keep crawler treads properly adjusted—never work machine with a loose crawler belt.

#### SEE THAT OIL OR GREASE REACHES EVERY PART THAT REQUIRES LUBRICATION

When a shaft, gear or clutch is in such position that greasing or oiling is impossible, operator should take time to turn machinery over so that every part may be properly lubricated. Oil lines to inner bearings should be inspected often, as vibrations sometimes loosen line connections. Regardless of how big a hurry you are to start the machine, remember, the oiler on the shift before you may not have taken time to oil or grease places not easily accessible.

*Be sure to use proper type and grade of lubricants*

#### LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division

NEW YORK, N.Y.  
SAN FRANCISCO, CALIF.  
SEATTLE, WASH.

PHILADELPHIA, PA.  
DALLAS, TEXAS  
SPOKANE, WASH.

NEWARK, N.J.  
PORTLAND, ORE.  
MINNEAPOLIS, MINN.

LIMA, OHIO  
MEMPHIS, TENN.  
LOS ANGELES, CALIF.  
ST. LOUIS, MO.



# LIMA

SHOVELS, 4 YD. TO 3 1/2 YD.

DRAGLINES, VARIABLE

CRANES, 13 TONS TO 65 TONS

*Buy War Bonds and Stamps*



# Keep 'Em Digging for the DURATION



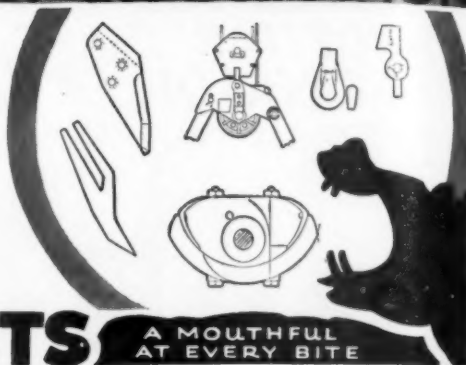
To keep them digging for the duration—(an especially long life of usefulness)—Owen Bucket repair parts are stocked at convenient points throughout the continent.

Distributors will be found ready and able to render prompt, efficient service.

## The OWEN BUCKET Co.

Breakwater Avenue, Cleveland, Ohio

Branches: New York Philadelphia Chicago Berkeley, Cal.



# OWEN BUCKETS

A MOUTHFUL AT EVERY BITE

## FAR-LIN PLASTIC

## SAFETY ROAD MARKERS

**NO UPKEEP • QUICKLY INSTALLED  
MAXIMUM VISIBILITY • PERMANENT  
WHITE • SURFACE REMAINS ABRASIVE  
and No Priorities Required!**

Safety-ize your county, city and park highways and boulevards with the new FAR-LIN Plastic Safety Road Markers. Made of non-essential white plastic under a patented process under heavy hydraulic pressure, these safety markers will withstand the heavy pounding of traffic without crushing or deterioration, and maintain their skid-proof abrasive surface under wear. They will remain white under all conditions. Quickly installed by your regular road gang with simple tools. Used extensively for crosswalks, curves and winding macadam, asphalt or concrete roads.

LOOK INTO THE MODERATE COST OF FAR-LIN PLASTIC SAFETY ROAD MARKERS FOR YOUR COUNTY, CITY AND PARK HIGHWAYS—WRITE TODAY!

**FAR-LIN, Inc. BURLINGTON  
NEW JERSEY**



# RBC

## ROLLER BEARINGS

*Help Build and Maintain*

*Air Bases*

**ROLLER BEARING COMPANY  
of AMERICA**

28 Whitehead Road

Trenton, N. J.

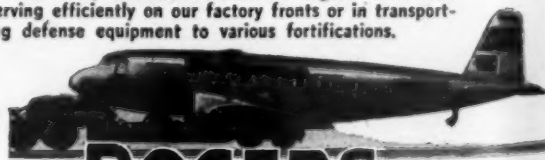


**ROGERS BROTHERS  
CORP.  
110 Orchard St.  
Albion, Pa.**

Tanks produce results only in actual combat on the firing line.

To conserve their fighting capacity they ride to battle on Rogers Trailers, or if damaged are transported to the rear for repairs on a retriever type of trailer especially equipped to load disabled tanks.

Meanwhile, thousands of standard Rogers Trailers are serving efficiently on our factory fronts or in transporting defense equipment to various fortifications.



**ROGERS  
LOW BED  
HEAVY DUTY  
TRAILERS**

# An Indisputable

# CLAIM



**B**UCKEYE R-B Power Finegraders have brought into the paving picture one of the few major advances in methods that have been introduced since the first pavers were built. These one-man operated machines, riding on the forms, slice the grade to exact cross section eliminating nearly all hand labor, reducing the loss of yield to a negligible percentage, ending penalties for thin slabs and ending the problem of keeping the grade well ahead of the paver. There are no delays with an R-B Finegrader — they move fast even in rocky soil. Many are working ahead of two 34-E pavers. They'll leave any desired amount of fines for compacting by the roller. Depth of cut is adjustable by hydraulic lifts. Two models provide cutting widths from 10' to 25'. If you have a road or airport paving contract, R-B Finegraders will speed up the job plenty. One good job and the machine pays for itself. Full details in new Bulletin. Send for it now.

**No other existing  
equipment can  
prepare subgrade  
as quickly,  
cheaply and  
accurately as**

**a  
BUCKEYE  
R-B POWER  
FINEGRADER**

**BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio**

Check Page 11

## Built by Buckeye

Convertible Shovels



Trenchers



Tractor Equipment



R-B Finegraders



Road Wideners



Spreaders





AT ARMY camps, flying fields and training centers all over this country and many other countries vital to Allied war effort, Cletracs are "doing their duty"—like good soldiers. Road building, bulldozing, hauling—moving earth, stones and trees to make army bases and training fields stronger, safer, smoother, for the all-out-drive for Victory.



In any kind of a job, in any part of the world—regardless of climate or conditions—Cletracs do the

tough jobs—easily, economically and rapidly.

Now that equipment is difficult to replace, the enduring qualities and dependability built into Cletracs are doubly appreciated. Keep your Cletracs working for Victory in all-kinds-of-going by frequent inspections, proper lubrication and prompt replacement of worn parts. Consult your Cletrac dealer—use his experience, repair facilities, and trained personnel to keep your Cletracs "Driving" for Victory.

THE CLEVELAND TRACTOR COMPANY • CLEVELAND, OHIO

## Cletrac Crawler Tractors

GASOLINE AND DIESEL





# ROADS AND STREETS

May, 1943, Vol. 86, No. 5

## Corn County Road Upkeep—1943 Style

How 1,400,000 gallons of asphalt are being stretched over 1200 miles of farm-to-market roads

**"A**RE we going to get materials to maintain our roads this spring, or aren't we?"

When I was able recently to answer this question in the affirmative, I was reporting a real piece of news to the farmers around Springfield, Illinois. Last year the tillers of this county's rich black land raised many millions of dollars worth of livestock, dairy products, poultry and eggs, soy beans and other produce as their war-time stint. And they're out to beat that record in 1943 in spite of the serious labor shortage.

This news was important to these folks because, while a few live along paved state roads, the majority have to travel from one to twenty miles to market over a local system that has been too extensive to afford high-type surfaces. Of the 186 miles of county roads, 47 miles have been given a bituminous stabilization, 20 miles are graveled, and 118 miles are typical oiled roads. Feeding into these are 1061 miles of township roads, which have been oiled every year or two as funds permit, as a means of serving the largest number of farmers.

Normally about three-fourths of the oiled roads, or some nine hundred

By RAY V. TILLY

County Superintendent of Highways, Sangamon County, Springfield, Illinois



Ray Tilly

miles, are scarified and reshaped each year and new oil applied. This year only a small percentage will be worked over other than by a light drag to fill depressions and smooth broken spots. Our object is to pre-

serve every ounce of existing bitumen in the road.

This year, of course, with road oil being unavailable, we had to turn to a substitute, an MC-1 asphalt, the lightest grade permitted under government regulations. Whereas the county and the twenty-six townships usually require about 3,000,000 gallons of road oil, our current allotment of MC-1 is approximately 1,400,000 gallons for maintenance, plus 300,000 gallons for stage-construction surfacing of a fifteen-mile access relief road to the Sangamon Ordnance Plant East of Springfield.

### One of the Largest "Road Oil" Users

You may wonder why the combined county and township quantity is mentioned. In this county we take bids for the townships along with our own supply, as a means of efficient purchasing. Then the townships enter into separate contracts for their respective allotments and finance and carry out their own maintenance work. The 3,000,000-gallon figure is of interest in that it begins to picture the size of our annual maintenance operation. Probably few counties in the country utilize more road oil than Sangamon County.

At Sangamon County's modern road commission headquarters, built in 1941.





Sengamon County's two 14,000-gal. oil-storage tanks, bought "second-hand" last year to aid rail service.



Reworking an old stabilized gravel surface. The county has 47 miles of black top in addition to its treated earth roads.

Normally our practice is to apply .45 gal. of oil per sq. yd. Last year we cut down to .35 gal., using mostly MC-1 or MC-2. This year the maximum allowable application is .25 gal., and our width limitations are typical in that we will be permitted to spread 18 ft. wide on roads carrying more than 100 vehicles daily, and 10 ft. wide where traffic averages between 25 and 100 vehicles. Virtually all township roads will be confined to a 9-ft. treatment, with township roads carrying less than 25 vehicles daily receiving no asphalt. Some townships under this ruling will get material on all their roads. One, how-



This old water pressure-tank is being built over as a hauling tank for supplying the steam boiler out on road oiling work. Shown is H. E. Roseberry, shop foreman.

ever, will be able to cover only 18 out of its 42 miles, and serious hardship is in store for many farmers next winter as these roads lapse back into bottomless mud.

While the .25-gal. application is not sufficient to keep up a good surface for long, it will "cut back" the old bitumen in the roadway and salvage and prolong its life. The result will

depend on how much bitumen is still impregnated from past years.

In addition to conserving materials, we are doing several things to nurse along our equipment. In our county we have seventeen patrolmen who use horse-drawn maintainers, aided by four heavy motor graders. The men are instructed to use their machines more lightly, with no general scarifying or discing except in special places which will total about 5 per cent of the county roads.

We have no illusions as to the final results of this skimping. It is estimated that a normally severe fall and winter will render virtually half of our local roads impassible in wet weather. As if to fortify and prepare us for what may lie ahead, the past winter and spring were worse than usual and, in addition to normal damage to the oiled system, we suffered about a 20 per cent break-up on our 47 miles of bituminous stabilized roads. But the bad winter had one good effect: it is helping us to find the soft spots and correct them to get more permanent stabilization. This spring we are adding 6 to 12 inches of gravel wherever weaknesses show up.

#### Storage Tanks Help Rail Transportation

Three bituminous distributors are used on county work. One, 20-h.p. boiler will continue to be adequate for the three machines.

Of special interest from the conservation standpoint are two 14,000-gal. storage tanks, purchased early in 1942 in anticipation of material and transportation shortages. These tanks, located in Springfield, help unload and store bituminous materials with less tie-up of rail cars and less frequent rail delivery. After a few months in service these units, which had seen use as gasoline tanks, start-

ed to distort under load and were strengthened with concrete cradles (see photo). Heretofore distributors had been loaded direct from cars, our only storage facility consisting of fifty 50-gal. drums for winter patching materials.

The financial picture is that our gas tax funds are down 40 per cent while we are having to buy asphalt instead of oil at a higher unit cost. However, if we can get materials and keep labor, we'll give the farmers some kind of emergency service. The big question will continue to be materials.

#### Vote on Bonds for Post-War Roads

Montana voters will decide June 8 on the question of issuing \$8,000,000 in highway debenture bonds to finance a post-war roadbuilding program, the state legislature has decided.

A bill passed by the legislature calls for submission of the question providing for an additional 1 cent per gallon tax on gasoline for the next two years, starting July 1, and for additional 2½-cent tax on each gallon of diesel fuel sold in that same period.

#### Mississippi State Highway Department Engineer Joins Navy

Robert Alexander Harris, chief engineer for the Mississippi State Highway Department since 1934, has been commissioned a lieutenant-commander in the United States Navy Reserve. Chief Engineer Harris, who has been with the Mississippi State Highway Department for twenty-three years, has been granted leave of absence for the duration, and in his absence his work will be carried on by other members of the engineering staff.



# MILLION-YARD WINTER PAVING JOB



Concrete was placed at a temperature of approximately 85 degrees

## Contractors used established protective measures plus some new tricks on large eastern airbase

**F**OR the simple reason that war cannot wait on winter, Army engineers and contractors carried through one of the largest cold-weather concrete paving operations in history on an eastern airport. By March 18, scheduled completion date, approximately 1,000,000 sq. yd. of concrete runways, taxiways and roadways were ready for traffic.

The field in question includes four runways and a typical complement of taxiways. One runway is of 9-in. uniform thickness except for the outer lanes and two center lanes, which are thickened to 12 in. in a distance of 12½ ft. Three runways have 8-in. slabs, with similarly thickened lanes. Taxiways are 12-8-12. Main and secondary roads in the reservation area are 8-6-8 in. and uniform 6-in., respectively.

### Notes on Grading

The field areas beyond runway and taxiway shoulders, were left uncleared of low wood growth. Clearing and grubbing of pavement and appurtenant areas involved no unusual methods. Stumps were bulldozed out. Nec-

[EDITOR'S NOTE: During the past winter cold-weather concreting was done on an unprecedented scale at four widely scattered airports totaling some 3,000,000 sq. yd. of paving. These jobs included a west coast bomber base, two mid-western fields, and the large Fighter Command base project described herein. This base, known as the Camp Springs project, Meadows, Md., covers 4700 acres and is the largest field of its kind in the United States. Its 4 miles of runways and 14 miles of taxiways are designed to help protect the Washington, D. C., area.]

essary excavation proceeded during the wet winter months, largely by means of draglines double-casting to spoil banks clear of the work. Shovels and trucks were used to get this material away as the job progressed.

Soils encountered ranged from sand and other excellent bearing soils that tested as high as 120 lb. per sq. in., to extra heavy clays and other soils that tested only 5 lb. per sq. in. when wet. Most of the soil proved messy

to handle under wet winter conditions, and the resulting subgrade made a very unsatisfactory construction roadway. For the two-fold purpose of helping carry equipment in all weather, and of strengthening the subgrade as a pavement base, extensive filling with selected materials was used.

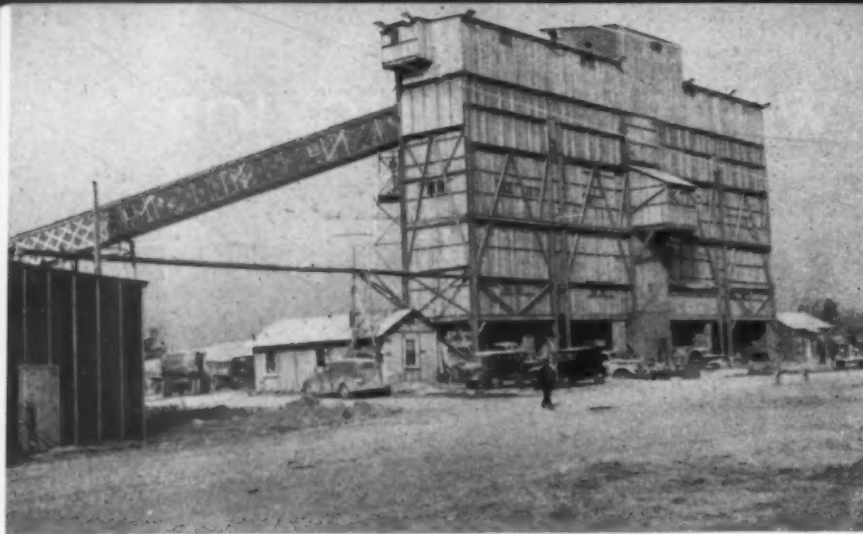
In all, about 1,000,000 cu. yd. of material was supplied from three pits, using large trucks and 15-cu.-yd. semi-trailer dump trucks. Compaction was accomplished by pneumatic tractor tires, sheeps-foot rollers and by passage of other equipment. On part of the job the material consisted of slightly silty medium sand; on the larger part, however, a coarse clayey gravel was spread down. The spread was 12 in. deep in cut areas and 18 to 24 in. or more in fills.

The entire fill of 3 to 4 feet sometimes consisted of selected material where natural soil was not suitable.

### Forms and Fine Grading

Most of the pavement was placed in 12½-ft. strips. After hand-placing standard steel forms, the subgrade

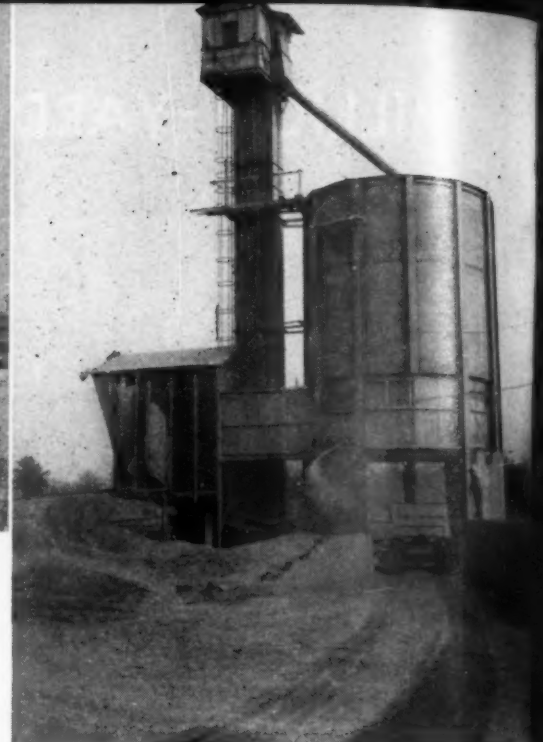




## Winterized Concreting Plants.

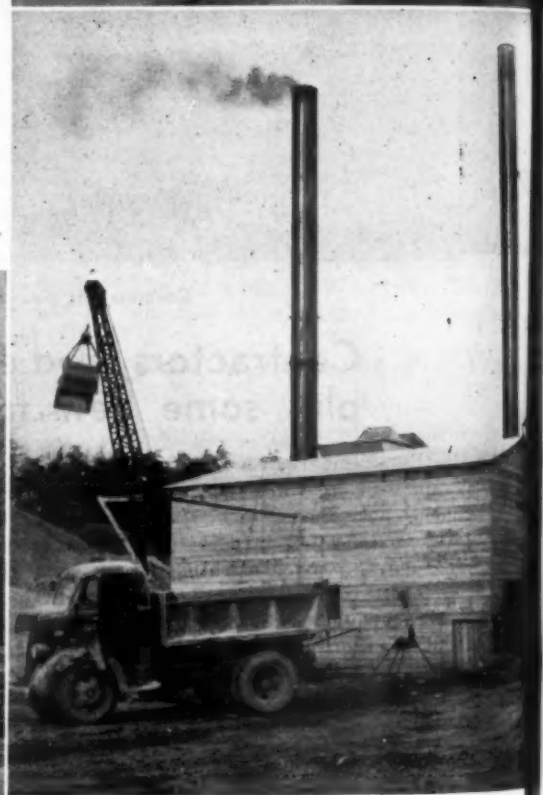
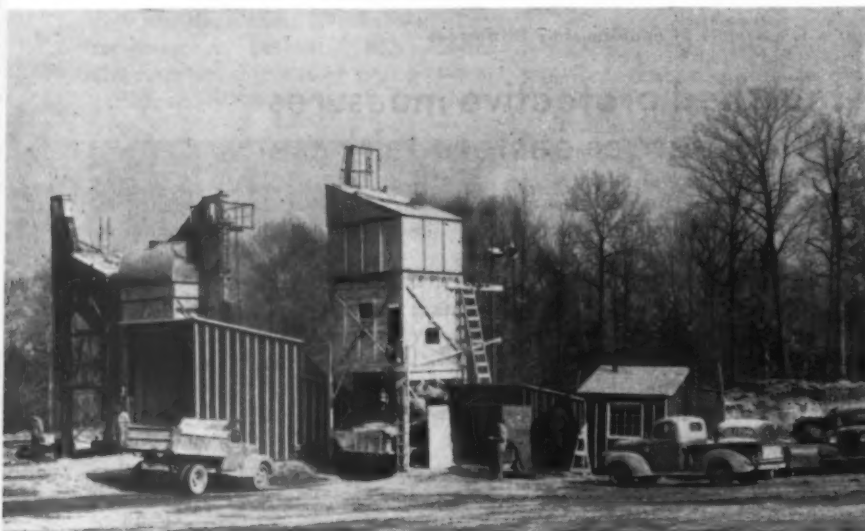
Above, left: Contractor No. 2's big all-enclosed plant, with four bins in one housing. Note overhead steam line from boiler house at left, and enclosed conveyor from the stock-piles. The cantilevered "bird house" on the plant wall housed a loudspeaker system for directing ground operations. The small building was test headquarters.

Above, right: Bulk cement bin serving two batching units.



Below, left: Contractor No. 3's plant, similar to No. 1.

Below, right: Boiler house for aggregate heating, Contract No. 1.



Batching Plant of Contractor No. 1—cement bin in foreground and heated aggregate bins in rear.

Coarse aggregate was bulldozed to stockpiles, where it was given preliminary heating before being elevated into the bins.





Above: Loading selected subgrade fill material from one of the pits on the reservation.

Left: Grading had to go so fast that there wasn't time to haul away. This shows excavation from runway areas being double-cast to temporary spoil banks.

was dressed down by a motor grader and finished by a mechanical subgrader which pulled a scratch template. Great care was taken to dig out and backfill all soft spots, which were then rolled. The finished subgrade—and here enters first consideration of Old Man Winter—was blanketed over with waterproof tarpaulins and a top covering of 1 to 1½ ft. of loose marsh-grass hay.

The purpose was to let no part of the subgrade freeze.

#### Batching Plants of Unusual Interest

Heretofore unmentioned is the fact that the job was handled under three contracts. Three batching plants were set up to serve mixers over the airport area. Contractors No. 1 and 3 each designed their plants to operate as two independent units, with each bin supplied from its own aggregate pile. Each plant included two 3-compartment aggregate bins, two 300-bbl. cement bins, two clams for loading into bins, and a boilerhouse (equipped in one instance with a 85-h.p. and a 125-h.p. hand-fired boiler) delivering steam at 75-80 lb.

Contractor No. 2's aggregate plant, designed to serve both paving and airport building construction was unique in that four aggregate bins were placed in a row and enclosed in a single protective structure.

There was a single bin for each of the aggregate sizes. The plant included four 3-compartment bins in the one enclosure: two conveyor belts, also enclosed in protective housing; one 2-compartment bin for loading the two sizes of coarse aggregates from stock-piles on to the conveyor belt; two clamshell machines; two bulldozers for shoving either coarse or fine aggregates into stock-piles for

clamming into the 2-compartment bin; a boilerhouse unit; and two 750-bbl. cement bins.

All materials were trucked to the three plants, and loaded back into batch trucks after weight-proportioning. One set of bins batched for transit-mix trucks for building work.

#### Heating Materials

Live steam was the heating medium for all aggregates. Plant No. 1 at first had no injector, water being pumped into boilers by a small gasoline pump. Only about 40-45 lb. steam could be maintained and the boiler fire had to be "pulled" every few hours to drop steam to 20 lb. during water intake. After installation of an injector the 75 to 80 lb. of steam desired to heat aggregates with least condensation was uniformly maintained.

As shown in Fig. 1, steam was injected into each side of the aggregate bins through jets leading from headers. Jets were located about 13 in. up from the bottom and about 10 in. apart. Additional headers through each compartment furnished steam to jets inside the compartment.

Mixing water was heated at the plant on one contract, and in the other contracts heated in the bituminous distributors used for hauling, either in transit or during the wait at the paver. Three distributors served each paver (1,100, 2,600 and 3,600 gal. on contract No. 1). They were so timed that one unit was always standing by for its turn at the machine. A portable gas pump dragged behind each distributor on timber skids, was used to pump hot water into the paver drums.

As soon as batches were loaded into the trucks, tarpaulins were quickly

thrown over them. Hauling of contract No. 1, which was typical, required about 15 two-compartment batch trucks, hauling 0.40 mile plus the distance along the runway.

#### Temperature Records

A feature of the job was the thoroughness with which temperatures were checked. The architect-engineer's inspector at each bin recorded temperature data hourly along with routine weight checks. Readings were also made in the stockpiled aggregates and in the cement on arrival. These data were given to the chief inspector daily.

At the paver a full-time inspector on top of regular duties made hourly readings in the subgrade, mixing water, freshly dumped concrete, and finished concrete before covering. These readings, followed closely by the area engineer, helped determine when it was necessary to make any adjustment in heating methods. The subgrade's protective featherbed of hay and "tarp" was removed just ahead of the mixer if the temperature was below freezing and likely to stay below. In warmer weather a whole day's run was uncovered at the beginning of work, and the hay placed on the adjacent lane in readiness for placing back on the newly finished slab.

#### Protective Measure After Placement

No special methods were involved in placing and finishing the concrete. Concrete on contract No. 1 was spread by either screw or blade-type spreaders, followed by two portable vibrating units mounted on the spreader for vibrating at expansion joints and along forms. A 2-screed





Top, left: The freshly dumped batches were again checked before spreading.

Top, right: Sampling materials from the paver skip for temperature readings.



Checking covered pavement. Note the white cloth held around the thermometer to reduce errors due to air temperature.



Readings were taken at various depths down through the finished slab and into the subgrade.

finisher was used. Belting was done with a twice-folded strip of oiled duck. Belting, dummy joint work and edging were usually kept within 200 feet of the paver.

Protective covering, laid immediately behind the joint men, consisted of a single thickness of waterproof paper (18 x 60 ft. sheets); a 15 to 18-in. layer of loose marsh grass; and waterproof tarpaulins over the hay, "tucked in" at the slab edges by means of small logs from adjacent clearing operations.

Forms were usually taken up in 24 to 48 hours, but this covering left 72 hours.

### Concrete Mixer Design

Normal portland cement was used throughout the job, with a cement factor 20% higher in cold weather than that specified for ordinary weather. (1.50 bbl. per cu. yd. with gravel, 1.58 with slag aggregate). Flake calcium chloride, 15 to 18 lb. per batch, or about 1½%, was added at the batch plant or in the mixer skip.

Slag aggregate was used on one contract and washed gravel on two. The coarse aggregate was delivered in two sizes—No. 2, from 2½ to 1 in. particles; and No. 6, from 1 in. down to No. 4 screen. All proportioning was by weight.

During January with the permission and cooperation of Army engineers, an elaborate series of temperature readings and data on other variables having a possible bearing on cold weather concreting results, were recorded over a test period by engineers from the Portland Cement Association. A full report of this test, including correlation of temperatures and strengths obtained, is expected to be published.

The Camp Springs job was a Corps

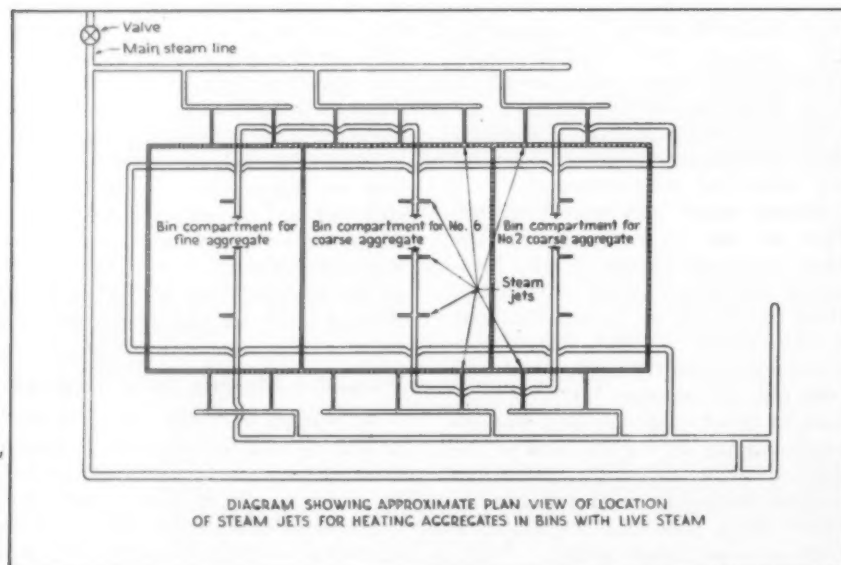


Fig. 1. Layout of heating pipes for the big single-enclosure plant at Contractor No. 2.



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Next came hay covering over the paper.



Interesting detail: burlap covered with dry cement, laid over joints to blot free water and permit quicker troweling.



Then large squares of waterproof duck were thrown on and thoroughly tacked down at edges.

## Below—32° Paving



Mixing water was heated in distributors, and pumped into the mixer by a portable gasoline pump dragged on skids as shown.



Paper was unrolled immediately in the wake of finishing operations.



Subgrade and template on Contract No. 1



Scratch-checking subgrade on a 25-ft. strip on Contract No. 3 (most paving strips were 12½ ft.)

of Engineers' project. Gannett, Eastman and Fleming, Inc., Harrisburg, Pa., were architect-engineers, represented by Sam Nugent, John Paul and A. G. Phillips, respectively in charge of testing, construction and materials. Testing at site by the E. L. Conwell Co., Philadelphia. General contractor was Brann and Stewart Company, Inc., Philadelphia. Paving subcontractors were C. J. Langenfelter and Son, Rosedale, Md.; Union Building & Const. Co., Passaic, N. J.; with Brann & Stewart also doing paving.

### Pooling of Road Machinery Urged

Pointing out that the failure to fully utilize existing equipment for civilian road-building will work hardships on all local governments undertaking road-building and maintenance work, the Governmental Division

of the War Production Board is urging highway officials to speed the plan for pooling of road machinery and equipment initiated by the Division several weeks ago.

As the season for road construction and repairing is here some commissioners are faced with the problem of obtaining necessary equipment. The problem is not the result of any lack of equipment. A survey on construction equipment owned by local governments shows there is enough such equipment within each state. The fault lies in inadequate use of the equipment, some of it being idle in one place when it is urgently needed elsewhere.

The pooling plan is designed to remedy this, making all equipment available to all local governments within each state.

The plan was initiated to reduce requirements for road-building ma-

chinery used on the home front because practically all new road-building machinery is being directly channelled to the military.

Though originating with the War Production Board, the plan is state operated with a state official as coordinator. Responsibility is completely in the hands of the state.

Twenty-seven states, to date, have pooling plans in operation.

### Uniform Limited Access Road Law Recommended by U. S. Public Roads

A compilation of provisions of limited access road laws in effect at the beginning of 1943 has been prepared by the Public Roads Administration and what PRA considers the most desirable features of these statutes have been consolidated into a model bill for consideration by highway authorities and state legislatures.

Subjects covered in the model bill include the declaration of policy, definition of limited access facilities, authority for establishing limited access roads, design of limited access facilities, acquisition of property and property rights, property condemnation procedures, authority for local units of government to consent, unlawful use of limited access facilities and serviceability.

In the opinion of Thomas H. MacDonald, Commissioner of Public Roads, "Limited access highways of the type that may be expected to assume an important position in post-war construction programs will be effective in serving their intended purposes only to the extent that adequate safeguards are provided against encroachment of undesirable activities or functions and improper access."

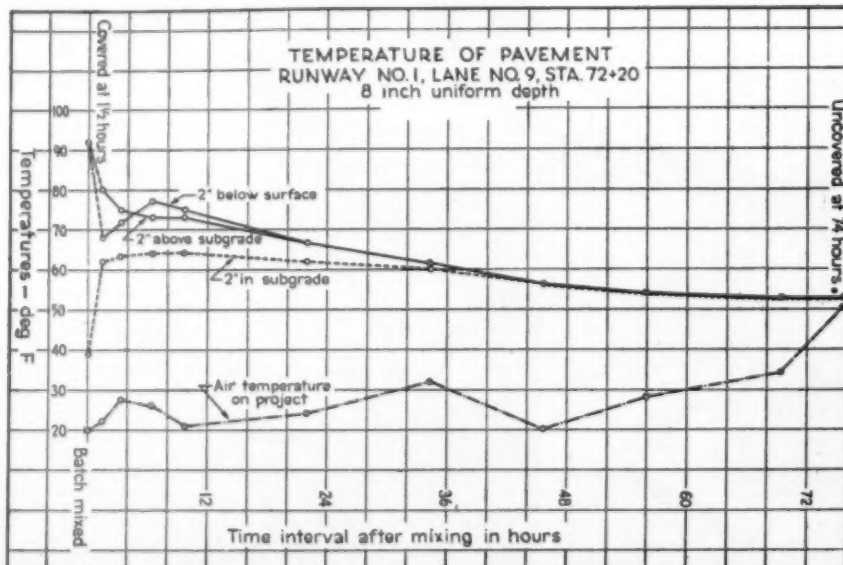
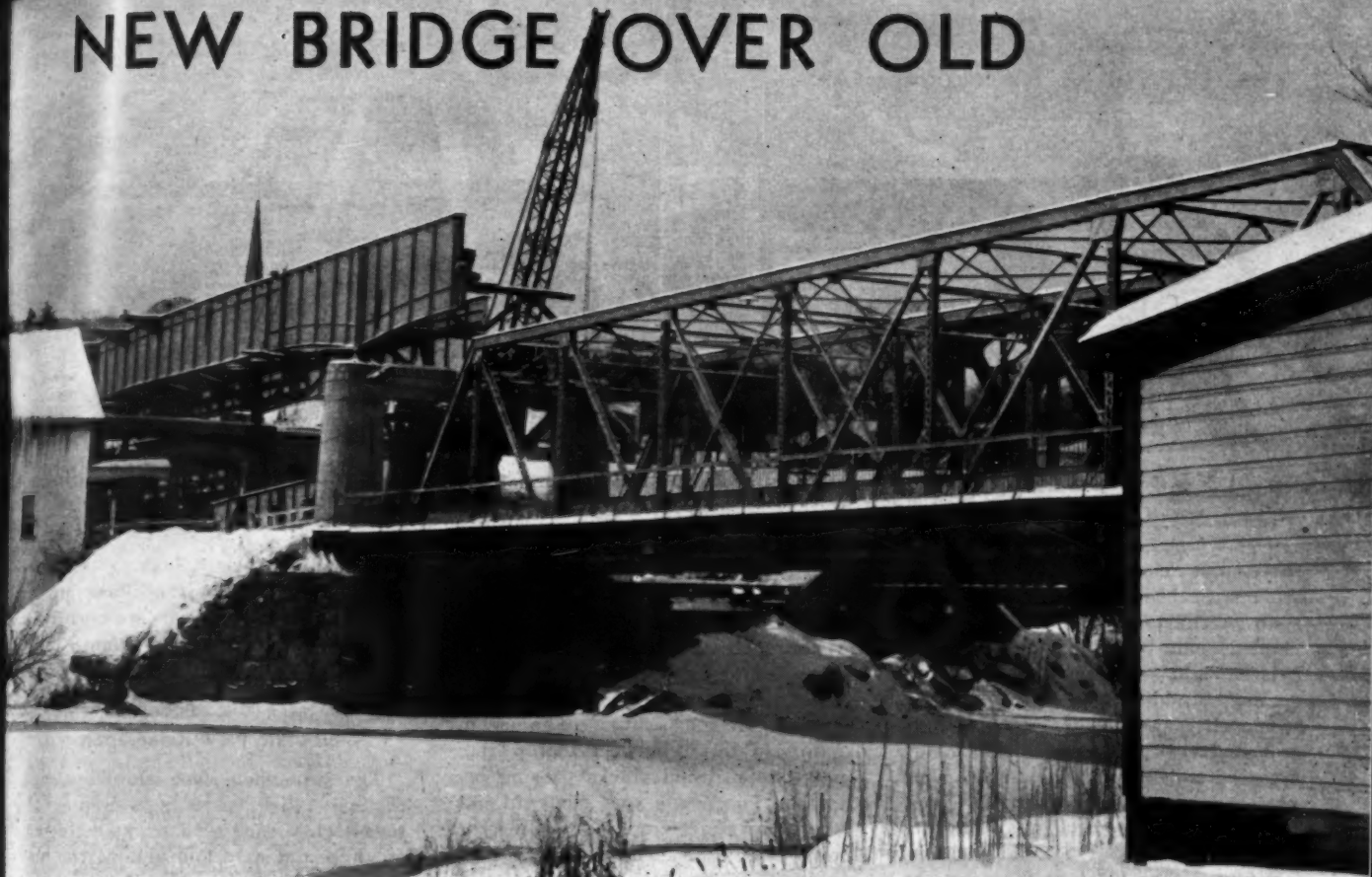


Fig. 2. Temperature readings over one test period, showing gradual converging of air, slab and subgrade



# NEW BRIDGE OVER OLD



The old bridge stays in, the new passes over it and straddles the lower roadway in Vermont's largest recent highway bridge project, at St. Johnsbury. Charles I. Hosmer, contractor

## Fast erection in sub-zero weather hastened this strategic bridge of novel design

By A. D. BISHOP

Bridge Engineer, Vermont Department of Highways, Montpelier

VERMONT'S first elevated highway bridge, and the longest bridge of any kind ever constructed wholly within the state, is the 890-ft. Portland Street Overpass in St. Johnsbury. In addition to these distinctions it is notable for several design features, including open-type piers which straddle the old low-level roadway, and the use of four types of span design in the deck girders. The 126-ft. suspension or river-span girders are immediately above the old

truss span, which is to remain in service to accommodate local traffic.

The project is located on U. S. 2 near the junction of U. S. 5, and is on the primary interstate route connecting Portland, Maine, with northern New York state, Montreal and Quebec. The structural steel, about 1,820,200 lb., was contracted at \$177,965 lump sum, the total amount of

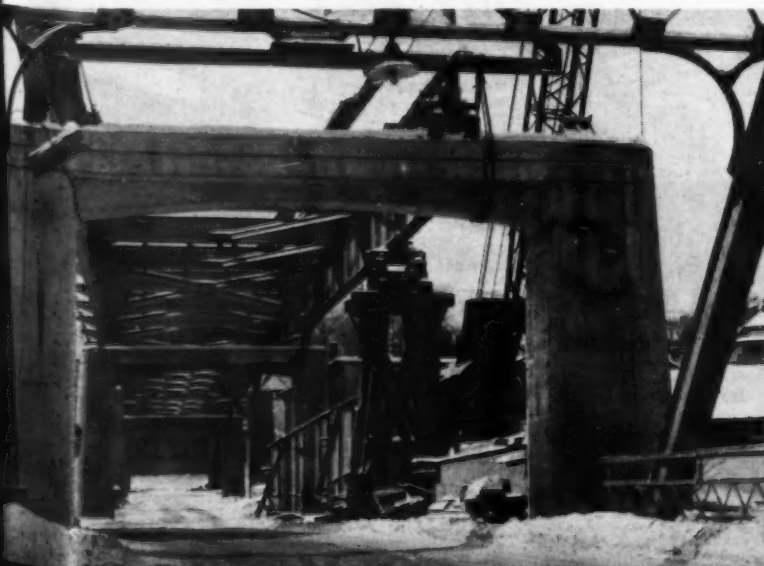
the contract being \$289,759.70. Foundations were completed in the winter of 1942. After much difficulty in obtaining a priority for the steel, erection started on December 1, 1942. Steel erection was completed May 1, 1943, and floor and guard rail erection, steel painting and cleaning up of the project should be completed about August 2.

### Structural Features

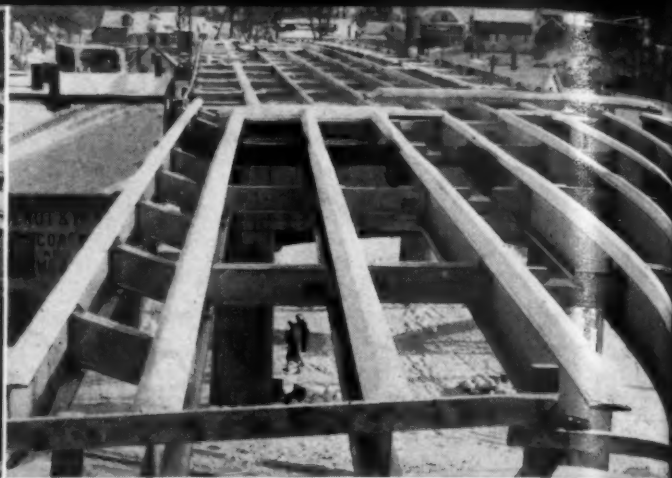
The bridge is a deck structure composed of one simple I-beam span, one

Looking off of the old river truss toward the west end, showing girder erection in progress with a locomotive crane

A 50-ton traveler placed steel on the east end







General views showing need for high-level valley crossing. It looks cold here—and it was! 50 below zero once during steel erection, which was completed in four winter months by Phoenix Bridge Company of Phoenixville, Pa.

three-span continuous section, one two-span continuous section, two one-span cantilever sections, and one suspended span. The bridge thus comprises eight continuous-type girder spans, in addition to the one single span. It passes over two railroads and a river, eliminating a bad grade crossing and also a weak bridge. The project is so constructed that it leaves the original bridge and its approaches entirely usable. A special requirement was that local traffic over the present river span should not be interfered with. The piers are all two-column open-type, and the two river piers have been carried to ledge. Each abutment also is carried to ledge and the remaining footings are spread on earth.

The deck has a concrete floor comprising a 30-ft. roadway and two 5-ft. sidewalks. The structure is designed for H-15 lane loading on three lanes, although traffic is to be kept in two lanes only. Provision is made on the east end for a by-pass to connect from high to low level; that is, from the new street to the original street. The bridge is built on a vertical curve connecting a 4.08% grade with a 5.16% grade, the length of the vertical curve being 925 ft. The total length of the bridge is 889.5 ft.

No difficulties were encountered in the foundation work except for the problem of the main heavy trunk-line of the New England Telephone Company, which also is the transcontinental trunk-line, and which lay in line with the columns. This had to be maintained and relocated as part of the construction.

Of particular interest are the portal-type piers designed to straddle the lower roadway. Deck drainage is carried down through the piers, there being no open drains which in any way can interfere with lower-level traffic.

#### Details of Steel Construction

Steel erection started December 1,

1942, beginning at the west end. Due to certain high tension wires crossing span 2, it was impossible to use an overhead traveler for the erection of spans 1 and 2. The first five spans were erected with the steel subcontractor's 75-ton crane. The beam span was erected between trains from main-line railroad tracks passing beneath. The crane was next cut out onto its own side track paralleling the new bridge; then moved to a position facing east, where it erected each span consecutively up to pier 5; after which it was stored in a position slightly north of the new structure until needed later for erecting the main river girders.

Work was then suspended on the west end and operations started on the east. The steel contractor's 50-ton traveler was unloaded at a nearby industrial yard and hauled to the east end of the project by truck. Here it was assembled with the aid of a truck crane. Girders for the east end of the job were hauled from the industrial yard and delivered on the lower roadway and erected by the

traveler up to pier 6, leaving the suspended span over the Passumpsic River to be erected. Girders exclusive of the river span ranged from 8 tons each for the I-beam span to 23 tons each for the girder spans.

#### Erecting New River Span

The suspended river span consisted of two 126-ft. girders weighing 41 tons each. Each girder was delivered on three flat cars and, due to the unusual length and to the fact that the old highway bridge below could not be disturbed, required special handling. These girders were delivered to a position on the Maine Central tracks where the locomotive crane could unload and store them for erection. The locomotive crane was then moved to a position where it could pick up these girders and transfer them to a location where the traveler, setting on the east side of the river, could reach one end of the girder, and between the two rigs erect them in final position.

For the girder on the south side this required two operations: First picking the girder with both rigs and



Showing additional structural details. Local business firms will continue to be served by the lower level

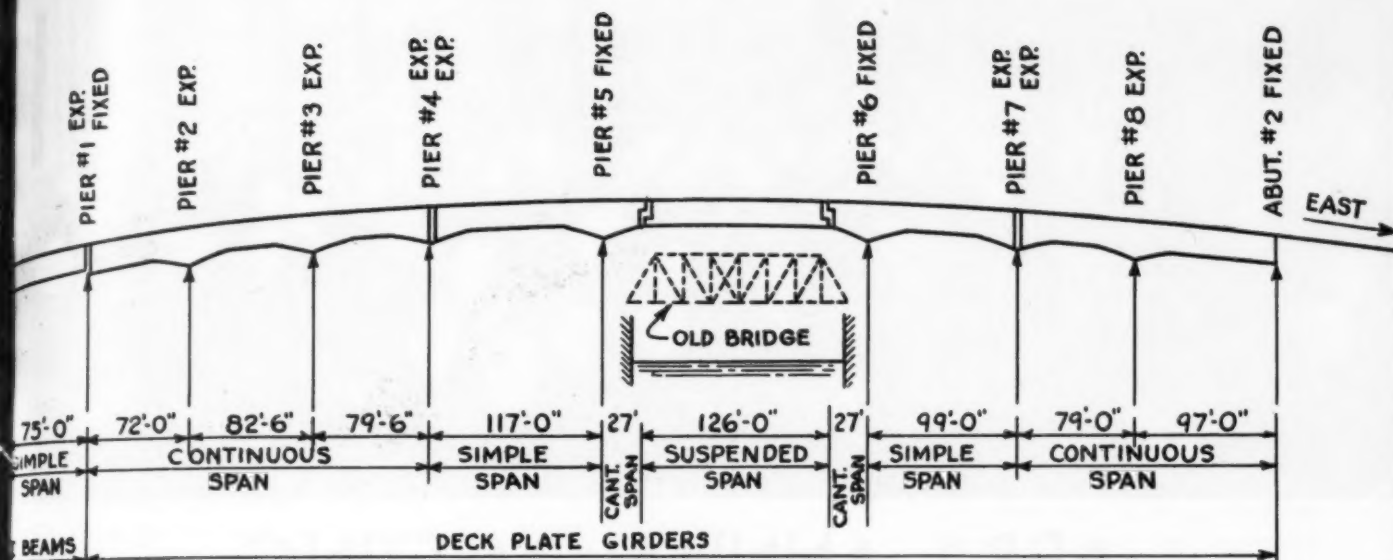


Fig. 1. General plan of the St. Johnsbury bridge

landing it on the north side of the new structure, then rehooking the traveler to take about two-thirds of the weight of the girder leaving the locomotive crane one-third of the load, and setting into final position. After erection of the main girder, the floor system and sidewalk brackets for the river span were erected by the traveler.

After filling in span 6, the traveler was dismantled near pier 5 by the locomotive crane and loaded into cars for shipment.

The railing for the entire job was then erected using a truck crane, running on a plank runway supported by the stringers. Only a short section of runway was built at a time, the planks being moved ahead as the work progressed.

#### Acknowledgments

The project was financed from the accumulation of about three years of federal grade crossing funds. Charles I. Hosmer, Inc., of Greenfield, Massachusetts, was the contractor with J. V. McNeil as field superintendent. Phoenix Bridge Company, Phoenixville, Pa., fabricated and erected the steel, with J. F. Kinter, erection superintendent and Wm. A. Ellis, erection engineer. Construction in the field was under the very capable direction of Harry Archinal, superintendent, who in spite of one of the coldest winters that Vermont has had for years (the temperature on one day going to 50 degrees below zero) and the inclination of skilled bridgemen to prefer warmer climates during the winter months, completed the job in four months.

The project was designed by the Vermont State Highway Bridge Department under the author's direction.

Ralph F. Taylor was resident engineer. Hubert E. Sargent is commissioner of highways and chief engineer.

#### Traffic Declines 37 Per Cent

Traffic on rural roads in the eastern rationed area in March declined 48 per cent and in the remainder of the country about 37 per cent from its pre-war normal of the corresponding month of 1941, the Public Roads Administration of the Federal Works Agency reported May 4.

The percentage decline in the eastern rationed area was about the same as in the past several months, and the decline for the rest of the country was about the same as in January and February, or nearly double that in the summer and fall months preceding nation-wide gasoline rationing. Traffic counts were made during March at more than 500 points in 42 states.

Traffic in February was off 52 per cent in the East and 35 per cent elsewhere, compared with the same month of 1941.

March motor-fuel tax collections in 29 States totaled \$23,621,000, or 28 per cent less than in March 1941, the Roads Administration also reported. The decline in the eastern rationed area was 40 per cent, and in the rest of the country 22 per cent. The tax payments were made largely on fuel purchased the previous month.

#### Big Turn-out at Michigan Road Builder's Annual Meeting

Of more than local interest because of its size and scope of subjects covered was the 15th Annual Banquet Meeting of the Michigan Road Builders Association, held April 26 at Detroit. Over 1100 were in attendance. Among the headliners in the long eve-

ning was Michigan's new State Highway Commissioner, Charles M. Ziegler, who outlined the job ahead in Michigan. Of equal interest were addresses by Governor Harry F. Kelly; Charles M. Upham, engineer-director of American Road Builders Association; Col. Paschal N. Strong, district engineer, U. S. Engineers, Detroit; Michigan Congressman Jesse P. Wolcott, member U. S. House of Representatives Roads Committee; and William B. Stout, noted plane designer with Consolidated Aircraft. District Judge Frank A. Pickart was toastmaster.

The program dealt largely with post-war plans, with special reference to the part that Michigan will play in highway development after the war and the part it is taking in war production today.

Lee M. Denton, of Denton Construction Co., Detroit, was elected president, succeeding Harry Pickitt. Ford Sargeant of the Bridgeport Core Sand Co., was elected vice-president, and Herman Holmes re-elected vice pres. from the Upper Peninsula. A. H. Fry is secy.-treas., and F. E. Koonz executive secretary.

#### Construction Totalling \$1,326,734,752 Stopped

Stop orders halting construction projects having a total cost of \$607,506 were issued by the War Production Board during the week ended April 30. This total brought to \$1,326,734,752 the total cost of all projects halted by either WPB or the programming agency since October, 1942, when the Facility Review Committee was established to examine the relation of construction work to the war effort.





## ARBA ANNUAL MEETING

### Focuses on Huge Post-War Job

**T**HE big machinery hall was missing, but there was no lack of big thinking, as 700 road-builders gathered May 4-7 at Chicago for the American Road Builders Association Annual Meeting and Post War conference. Pressed as those in attendance undoubtedly were with immediate war-time problems, they kept largely to the main purpose, which was to give thorough consideration to the vital part that roadbuilding can and must play in America's transition from war to peace. Universally agreed was that action must be taken now, if the industry expects to be ready to build when war demobilization begins.

Dominating the meetings from the start was the vision of a \$3,000,000,000-a-year post-war road program, as outlined to division and general sessions by engineer-director Charles M. Upham.

#### County Men Discuss Direct Federal Aid

The County Officials' Division fired

the opening gun in a Tuesday morning session with Manton Hannah, McLennon County, Texas, outgoing president of the County Division, presiding. Before a packed hall Mr. Upham's outline of the post-war program was followed by discussion of the part that local roads should play in the future. Major John A. Long, former ARBA staff man, reminded that the job is too big for any one agency. Mr. Hannah underscored the tremendous collective importance of local roads, giving figures to show that they overshadow trunk roads in many areas in total vehicle-miles of traffic. He also told the need for a sympathetic understanding of rural road problems (as against metropolitan) by all public agencies. He urged that county engineers make more traffic counts and gather other data which will prove the county's right to a substantial share of post-war funds.

Otto S. Hess, County Engineer, Kent County, Michigan, proposed that

federal aid be allotted directly to counties, and that a national Rural Roads Administration be formed to function as an organization paralleling the Public Roads Administration under FWA to administer direct county aid. \$300,000,000 a year on a 75-25 matching basis was advanced as a justifiable post-war county-aid program. Local road work, he pointed out, furnishes employment out in the communities where it is needed, often ten times the employment compared with trunk roads. Direct federal-county aid would stimulate higher standards of engineering service, necessary to qualify, as was the case with the state highway departments in the years following the passage of the first Federal Aid act in 1916. County-federal aid would lead to greater efficiency by requiring contract work where many counties now have no other choice than force-account methods due to lack of engineering facilities.

Clyde Akers, County Engineer, Davidson County, Nashville, Tenn., told of Tennessee's gas tax apportionment, which divides one cent on a population and one cent on an equality basis, to help the weaker counties. He warned of need to be ready with working plans. Arthur F. Ranney, County Highway Engineer, Summit County, Akron, Ohio, presented one contrasting condition in the federal-county aid picture, stating that 80% of Ohio's counties would find it hard to meet F.A. standards. John Giberre, Nassau County, N. Y., spoke for metropolitan counties where handling of traffic is the big problem and purchase of rights of way the primary county expense. Mr. Upham closed



At the President's Banquet: (From right) Charles M. Upham, engineer-director, ARBA; Carl W. Brown, president-elect, chief engineer, Missouri highway department; toastmaster Paul B. Reinhold, vice-president ARBA, and president Reinhold & Co., Pittsburgh, Pa.; guest speaker, Hon. Jennings Randolph, Member U. S. House of Representatives roads committee



this discussion by giving figures showing how county road construction has declined from \$300,000,000 annually in the '20's to \$175,000,000 in recent years, and warned that some counties would resist efforts to raise their standards to meet federal aid.

### Direct Federal-City Aid Suggested, Too

On Tuesday afternoon a smaller gathering, with Raleigh Gamble presiding, discussed the city's post-war role. Mr. Upham placed responsibility on cities along with all other agencies to unite in their post-war efforts. Cities should be ready to invest \$500,000,000 annually, he said.

Mr. Gamble stated that American cities for the first time are ready to receive direct federal aid; a large percentage if not all have the necessary engineering services to qualify. The discussion quickly brought out many serious complications as well as advantages on the idea of direct federal-city aid. Posers: What size cities would come under the wire? Could aid to several hundred cities be administered efficiently? What basis of allocation between cities? What per cent of a city's streets should be designated as federal aid streets? Should federal aid cover curbs, walks and other improvements? A preliminary analysis by James A. Foster, Portland Cement Association, underscored some of the difficulties, such as the absence of street mileage data, the great divergence in ratio of arterial streets to total mileage. Seven per cent was suggested as a maximum federal aid street mileage, scaled down to 5 per cent for smaller towns. New Orleans' City Engineer, N. L. Marks, took exception to the federal-city aid idea, pointing with pride to his city's ability to get along without "going to Washington." (New Orleans is paved 95 per cent without federal funds.) Walter Frickstadt of Oakland, Calif., suggested that aid be



ARBA municipal division officers-elect: Walter N. Frickstadt, vice-pres., western dist. (supt. of streets, Oakland, Calif.); Raleigh W. Gamble, president for fourth term (supt. of street construction and repairs, Milwaukee, Wis.); N. L. Marks, vice-pres., southern dist. (city engineer, New Orleans); J. B. Wilson, city engineer, Louisville, Ky.

County men: P. B. Traver, president-elect, county division ARBA, county supt. of highways, Onondaga County, N. Y.; Major John A. Long (formerly of ARBA staff); Manton Hannah, past-pres., county division, county engineer, McLennan County, Texas

extended to all cities as a unit in metropolitan areas.

As with the County Section, the Municipal Section put the direct federal-aid question in committee for further study.

### Manufacturers Hear of Latin American Opportunities

On Wednesday afternoon the Manufacturers Division head, W. A. Anderson of the Office of Coordination of Inter-American Affairs talk on post-war possibilities of Latin America. W. C. Grant, head of an advertising agency which has pioneered in Mexican, Central and South American advertising, outlined the publicity media available for a cooperative educational program by American manufacturers to sell the "Good Roads" idea. Cultivating the vast potential Latin market, he indicated, will require first of all the selling of an idea to the people, just as citrus fruit was sold to the people of this country. Consistent use of foreign magazines to reach influential citizens, newspapers to reach masses, and American export trade and technical papers would be required.

### Army and Navy Leaders at Contractors' Banquet

Highlights of the Wednesday night contractor dinner, at which president-elect James J. Skelly presided, were addresses by Captain L. N. Moeller, Director, Progress Control, Navy Bureau of Yards and Docks, and by

Col. E. R. Needles, Chief, Construction Control Office, Corps of Engineers. Captain Moeller hazarded an estimate of the possible dollar value of Navy contract work in store through 1944, saying that 1943 naval construction may reach \$2,400,000,000. While domestic jobs have tapered off, overseas construction has increased gigantically. Army fronts call for more and more militarized construction work for defense bases at front lines and various echelons to the rear.

The demand for certain types of construction machinery is rising at this time, due to the vast requirements by the Army and Navy for advance bases, said Capt. Moeller. He praised the construction industry's part in the war, showing how the 1942 Navy construction program of \$2,700,000,000 was 75 times its \$36,000,000 volume in 1936.

The Navy will return rapidly to the contract system, now that the big rush is over, abandoning if possible the cost-plus-fixed-fee system for lump-sum or unit-price negotiated contracts, and inviting informal bids from selected contractors. He said that contractors could quite properly consider post-war needs today, and that those looking for a big future challenge should look to South America and other countries.

Col. Needles revealed that the War Department has helped in the rehabilitation of huge quantities of equipment, involving upward of 100,000 pieces, and that one-fourth of all heavy construction equipment at some time or other has been in Army possession, including several thousand units sent to Alcan Highway this year. But there is to be no more purchase or rental-recapture, he explained, and the Army hopes to be out of the equipment business in three to six months. Standard makes and models have been designated for troop use. The Army is trying to convert all obsolete equipment into scrap, and is offering some less serviceable units for civilian use. New equipment is going into combat zones, while rebuilt units are sent to non-combat areas.

Col. Needles stressed the great con-



(From left) Carlos Bazan, Director General of Highways of Mexico; Jose Rivera, Secretary ARBA Pan American Division, Mexico City; Hon. Dennis Chavez, Member, Committee on Post Offices and Post Roads, U. S. Senate; Hon. James W. Mott (Ore.), Member, U. S. House of Representatives Roads Committee



Middlewestern bunch (reading clockwise, beginning with nearest): Murray Shaffer, chief engineer of location and design, Ohio dept. of hys.; E. C. ("Et") Wenger, Portland Cement Assn.; Capt. N. O. Wagner, Spokane (Wash.) Air Depot; E. E. Duffy, planning secretary, Wayne County (Mich.) road commission; Samuel C. Hadden, chairman, Indiana hy. comm.; Carl D. Franke, midwest manager, Portland Cement Assn.; Wm. M. Holland, exec. secretary, Indiana Highway Contractors Assn.; John Helgeson, Portland Cement Assn.; John (Jack) K. Norton, engr. of highways, Wayne County, Mich.; M. J. Hoffman, Minnesota highway commissioner

tinuing need for certain types of equipment, and the role that the road building industry has played in supplying both equipment and expert knowledge, making possible the vast construction work incident to overseas operations.

#### Thursday's General Session

The Thursday a. m. general session, vice-pres. Paul B. Reinhold presiding, was featured by talks by president-

construction industry—as compared to only 500,000 at the recent peak of the war construction program. His plea was for immediate attention to the time-consuming legal and financial phases, acquisition of sites and the advance engineering, so that workers can be put to constructive, needed projects instead of make-work or dole when the war ends. New York's \$10,-000,000 appropriation for immediate

L. McClellan of the U. S. Senate Committee on Post Offices and Post Roads on "Postwar Highways and Private Enterprise"; by Hon. J. W. Robinson, Chairman of the U. S. House of Representatives Roads Committee on "New Aspects of Federal Aid"; by Hon. Dennis Chavez of the Senate Committee on "Inter-American Highways"; and by Major I. V. A. Huie, New York City Commissioner of Pub-



Left around table: Prof. A. Diefendorf, Univ. of Utah, pres. ARBA educational division; A. W. Thomas, vice-pres. Chain Belt Co.; I. V. Casey, town engineer, Irvington, N. J.; D. A. Kalton, Chain Belt; J. E. Hausman, dir. of public works, Irvington, N. J.; Prof. L. C. McCandless, Univ. of Pittsburgh; T. R. Kendall, editor, Contractors & Engineers Monthly



Having fun here (around table) are S. F. Beatty, president, Austin-Western Road Machinery Co.; T. H. (Tom) Cutler, Kentucky state highway engineer and brother Joe Cutler; Jim Wilson, city engineer, Louisville, Ky.; H. G. (Hal) Sours, Ohio director of highways; Tom Calloway, Goodyear Tire & Rubber Co.; Joseph J. Tumpeer, president, Pioneer Asphalt Co.



Hon. Karl Stefan (Nebr.), "House" Committee on Appropriations; Hon. Jesse Wolcott (Mich.), "House" Roads Committee; Hon. John J. McClellan, Senate Committee on Post Offices and Post Roads; Hon. J. W. Robinson (Utah), Chairman U. S. House of Representatives Roads Committee; Hon. Jennings Randolph, "House" Roads Comm.; Paul B. Reinhold, vice-pres. ARBA

elect Carl W. Brown; General Phillip B. Fleming, Federal Works Agency Administrator; and W. P. Withrow, president of Blaw-Knox Co.; and words of good will from Carlos Bazan, Director General of Highways of Mexico, speaking for Honorable Maximino Avila Comacho, Secretary of the Communications of Mexico. Mr. Brown urged an immediate start on post-war plans, warning that a thoroughly-thought-out highway program could fail here due to failure to secure rights-of-way in time, or to lack of proper enabling legislation. He urged that all plans give proper consideration to urban problems, citing Chicago's superhighway plan and the effect of the war on this effort.

General Fleming dwelt on the possible magnitude of the post-war transition task, and took to task those who feel that we can slide back into peace and prosperity without some unemployment. By one analysis, he foresees that possibly two million workers must find jobs through the

blue-prints is cited in heartening contrast to the discouraging lag in many places.

Mr. Withrow placed responsibility for leadership squarely with the high-



Wardner B. Scott, state engineer of Nebraska (right), and party

way industry and pointed out that the proposed \$3,000,000,000-a-year road program would employ three million workers.

The Thursday afternoon general session, with president Carl Brown presiding, was addressed by Hon. John

lic Works, on "Post War Planning and Financing." Congressman Robinson referred to the huge backlog of work on a fast-deteriorating road system.

On Thursday night at the President's banquet, Paul B. Reinhold was toastmaster and Congressman Jennings Randolph gave a memorable address on America at war and the part that roadbuilders have played.

#### Friday's Post-War Forum

With Col. Willard T. Chevalier, publisher of "Business Week" as moderator, Friday morning was devoted to a post-war forum. Mr. Upham again reviewed the post-war preliminary plan; then a panel of congressmen and industry leaders discussed phases. Congressman James W. Mott of the House Roads Committee reminded that road planning is first of all a problem of legislation. He said no one should feel unpatriotic in taking time to plan now; it is as natural and necessary to plan for peace during war as it is to plan for war during



peace. These plans should be developed by practical road builders and not theorists. Prof. A. Diefendorf, University of Utah, told of the problems of engineering schools in war.

M. B. Garber, Acting Director, Construction Machinery Branch, WPB, explained that construction machinery makers have been running double capacity for two years with little plant expansion or conversion. He ventures little overseas equipment will come back to this country. Post-war road builders will have to begin with 3 to 7-year-old units. Two post-war phases: Reconstruction of war-torn areas abroad, using some lend-lease units, as well as U. S. Army; construction at home, hampered by a serious shortage of good machinery, aggravated by wear and obsolescence.

E. R. Galvin, General Sales Manager, R. G. LeTourneau, speaking in behalf of the construction industry said that it was one whose products fitted and were ready when war came. Manufacturers, distributors, and contractors have helped train thousands of new workers, sent many men into the war effort. Makers are planning units that will obsolete present equipment. He lauded distributors, both individually and as a group, and showed how distributors have helped OPA work out rental rates; helped the army in rounding up \$200,000,000 worth of machinery; lent their shop facilities; provided equipment inventories; helped train war users in equipment operation. Equipment distributors have formed two engineering maintenance units in the army, involving 300 to 400 men.

In discussion H. G. Sours, Ohio Director of Highways, touched on the financial trend, saying that while Ohio's gas taxes are down 24 per cent, their motor revenues are up, and that some states are accumulating a surplus which can be salted away for post-war use. He urged that such reserve funds be thoroughly earmarked for this use to help keep them intact.

Col. Chevalier at the Friday luncheon emphasized the basic value of highways, foreseeing that the make-jobs angle might be of no importance in a post-war boom. A reconstructed road system would stimulate rebirth of many industries including the automotive, rubber, petroleum and others dependent on motor transport. No other form of public improvement is so directly the foundation of private enterprise and industrial expansion on a vast scale.

Friday afternoon with Mr. Upham presiding, Frank W. Herring, Assistant Director, National Resources Planning Board, presented figures showing the need for a 14 billion dol-

lar annual after-war program (closely agreeing with conclusion in the Upham-ARBA analysis, which suggests 15 billion).

Congressman Karl Stephen championed farm-to-market roads as vital in moving food tonnages. Robert Moses, New York Planning Commission, whose paper was read by Sidney M. Shapiro of the Long Island park commission, condemned the grandiose academic projects, saying that practical self-liquidating projects should be put in the ready-for-bids stage now.

H. O. Penn of H. O. Penn Machinery Co., in a paper "Availability of Equipment for Post-War," assured that equipment distributors would be ready. Some 400,000 privately owned equipment units are inventoried by WPB, and much of the Army's equipment will need little conversion. Wear and tear will deplete this reservoir rapidly. He asked for industry-wide cooperation — CEM, AED, AGC, AASHO, ARBA, etc. And he urged owners of good equipment to get all spare units into the hands of the army, as a means of taking the load off overworked factories and clearing decks for the future.

#### Officers and Directors

Carl W. Brown, chief engineer, Missouri state highway department, was elected president. Vice presidents (all re-elected) are Paul B. Reinhold, northeastern district, President of Reinhold & Co., Inc., Pittsburgh, Pa.; Charles W. Smith, southern district, president, Smith Engineering & Construction Co., Pensacola, Fla.; Lion Gardner, central district, vice president, Jaeger Machine Co., Columbus, O.; Robert A. Allen, western district, state highway engineer of Nevada.

H. C. Whitehurst, director of highways, Dist. of Columbia, was re-elected treasurer.

Directors for term expiring 1946 are R. H. Baldock, state highway engineer of Oregon; Robert B. Brooks, consulting engineer, St. Louis, Mo.; J. F. Cast, manufacturers' sales agent, Firestone Tire & Rubber Co.; Akron, O.; Paul L. Griffiths, Butadiene Division, Koppers United Co.; Pittsburgh, Pa.; W. R. Macatee, managing director, Asphalt Institute, New York, N. Y.; A. E. O'Brien, secretary, associated Pennsylvania Constructors, Harrisburg; Nello L. Teer, contractor, Durham, N. C.

S. F. Beatty of Austin-Western was made honorary president of the association in recognition for his long and distinguished service to the road industry.

#### New Division Officers

Four of the Association's divisions held elections, as follows:

**Manufacturers' Division:** E. R. Galvin, General Sales Manager, R. G. LeTourneau, Inc., Peoria, Ill., is president. Robert T. Harris, vice president in charge of construction equipment, Blaw-Knox, Pittsburgh, Pa., is vice-president. Henry N. Schramm, president, Schramm, Inc., West Chester, Pa., is secretary-treasurer.

Directors for term ending 1946 are: T. M. Deal, president, Link-Belt, Speeder Corp., Chicago, Ill.; Wm. A. Roberts, general sales manager, Allis-Chalmers Mfg. Co., Milwaukee, Wis.; J. L. McCaffrey, vice-president, International Harvester Co., Chicago, Ill.; Paul B. Cochran, general sales manager, Buckeye Traction Ditcher Co., Findlay, Ohio; C. D. Macpherson, Hoist & Body Division, Gar Wood Industries, Detroit, Mich.; A. A. Anderson, manager, highways and municipal bureau, Portland Cement Association, Chicago, Ill.; C. B. Smythe, vice president, Thew Shovel Company, Lorain, Ohio.

**County Highway Officials' Division:** President is R. B. Traver, county supt. of highways, Onondaga County, Syracuse, N. Y. District vice-presidents are Herman F. Meyer, Jr., county engineer, Baltimore County, Towson, Md.; Duncan M. Campbell, chief engineer, Cook County highway Department, Chicago, Ill.; Ben T. Collier, county engineer, Coahoma County, Clarksdale, Miss.; Paul B. Rynning, county engineer, Jackson County, Medford, Ore.

County Directors for 1946 term are: John A. Bromley, county road engineer, Anne Arundel County, Annapolis, Md.; Alan N. Buck, county supt. of highways, Macon County, Decatur, Ill.; Thomas H. Edwards, county engineer, Montgomery County, Montgomery, Ala.; A. C. Fulmor, county surveyor, Riverside County, Riverside, Calif.; L. P. M. Gaylord, county supt. of highways, Lewis County, Lowville, New York; Otto S. Hess, engineer-manager, Kent county road commission, Grand Rapids, Mich.; A. W. Hinderman, county engineer, Louisa County, Wapello, Iowa.

**Municipal Division:** President (4th term) is Raleigh W. Gamble, supt. of street construction and repairs, Milwaukee; vice presidents are Dudley T. Corning, chief, bureau of highways and street cleaning, Philadelphia; N. L. Marks, Jr., city engineer, New Orleans; Henry B. Steeg, city engineer, Indianapolis; Walter N. Frickstadt, supt. of streets, Oakland, Calif.

Municipal division directors elected are Paul J. Essick, Jr., deputy chief, bureau of highways and street cleaning, Philadelphia; R. C. Harris, com-

(Continued on Page 59)



# Nation Faces Critical Road Conditions

While new road construction has been greatly curtailed, a large maintenance effort must continue throughout the war if America's workers are to get to and from their jobs, if war materials are to keep flowing, and if farmers can hope to deliver the all-out production expected of them.

Maintenance can be restricted for a time, but must not be allowed to fall below certain definite levels of preventive efforts. Regardless of fund limitations and shortages of men, machinery, materials and transportation, some way must be found to keep above these levels.

Nature dealt below the belt in many states, the unusually severe past winter and spring leaving a larger-than-usual trail of wreckage.

While traffic in general is down 30 to 55 per cent, traffic volume on certain routes is up. Truck traffic in general is higher compared with a year ago. The volume of very heavy fast trucking is away up, and many thousands of miles of truck lanes are literally being pounded to pieces as a sacrifice to the gods of war. These will require extraordinary repairs, resurfacing, and in some instances complete reconstruction soon.

These are some of the conclusions from various reports received by the ROADS AND STREETS staff in recent weeks. Excerpts of some of these reports are presented herewith. (See also the first article in this issue on county road needs in downstate Illinois, and comments on Ohio's spring maintenance problem in April R&S, p. 39.)

## Difficulties of Spring Maintenance in N. Dakota

Ray Robinson, North Dakota state maintenance engineer, writes:

The Spring of 1943 has been one of the most difficult in the history of the Department. During the past winter the snowfall in North Dakota ranged from 20 to 80 inches, and one-third of the area of the state had a snowfall of over 50 inches. On March 16 and 17 North Dakota experienced one of the worst blizzards in its history, and all forms of transportation were paralyzed.

When this heavy snowfall started to melt and run off, flood conditions existed throughout the state. All rivers and creeks were out of their banks and many of them reached a high water stage never before recorded. All the flood water, added to the normal spring breakup problems



U. S. Highway No. 10 at west approach to Missouri River bridge at Bismarck, N. Dak., April, 1943

(frost boils and soft subgrade), created a very unusual and difficult problem. Fortunately very little damage was done to structures, although numerous approaches were completely washed out. Fills across low places were badly damaged; they became saturated with water, making them soft and impassable in many places.

It was necessary to reduce the maintenance budget 25 per cent below that of the year 1942. The income for maintenance purposes is derived from the gasoline tax. The rationing of gasoline has greatly reduced the amount of taxable gasoline consumed.

With excessive expense for snow removal, repair of flood damages, a 25 per cent decrease in the budget, a shortage of skilled labor, and an increase in heavy truck traffic, the state is facing a critical situation. The maintenance budget for 1943 has been set at \$1,500,000; in 1942 the budget was \$2,000,000.

The Maintenance Department had programmed 274 miles for sealing of bituminous surfaces, 571 miles for replacement of gravel, and 25 miles of betterments. However, due to the excessive expense in repairing flood damage, it will no doubt be necessary to reduce the above program by more than 50 per cent.

For routine and major maintenance work on bituminous surfaces, 1,800,000 gallons of bituminous material have been allocated.

Requirements of all kinds have been cut to the minimum in both materials and equipment. Old equipment which under normal conditions would be considered obsolete is being repaired and put into service.

In past years the Department has centerline-striped practically all its

paved surfaces. This program will be eliminated for the duration. Expenditures for highway marking and other traffic services are to be greatly reduced. This department feels that these items of expense can be almost entirely eliminated, due to the fact that tourist and other passenger car traffic has been greatly reduced and the traffic hazards under the existing thirty-five mile speed limit are materially lessened.

## Illinois Has Large Repair Program Under Contract

Of special interest in Illinois is a continuation of last year's ten-million dollar repair program on the state road systems. Much of this work involves patching older concrete roads which have been worn out by heavy traffic. Again this year this work is being done under contract. ROADS AND STREETS expects to publish the methods in an early issue.

## Heavier Loads in Wyoming

C. F. Seifried, State Highway Superintendent of Wyoming:

Some of our highways are carrying a much heavier gasoline and other bituminous tank-truck traffic to relieve tank cars on the railroads for hauling gasoline to the sea coasts. In spite of the unusually severe spring breakup, Wyoming highways are still in first class condition. It looks as if we will be able to keep them that way.

We are granting permits for moving heavier weight loads over the highways and intend to continue doing so. The only restrictions that we have been forced to put on the highways this year is in one or two stretches totaling some 30 or 40 miles where we have set a 35-mph. speed

limit. On one or two stretches it has been necessary for us to add additional gravel under some of the oil mats in order to hold them.

As you no doubt realize, for the past several years Wyoming has been retiring some of its older roads by the reconstruction and construction of new and higher types of roads. For the past two years this reconstruction has stopped and therefore some of the older roads would have gotten away from us had we not taken measures to let contracts to get additional gravel.

We expect to spend some \$950,000 on State highways for maintenance this year and, if at all possible, a small sum for betterment.

The County and local road situation is about the same as it has always been. The majority of our county roads are very light traveled roads and the counties have had no trouble in keeping them up so far. The city streets are deteriorating in some cases but we note that the cities are getting in their applications for bituminous oil certificates and we expect that they will be on the job and get their streets patched so that we can navigate over them.

We are using no stop-gap maintenance methods but we are concentrating on maintenance on the surface of the road in order to keep it smooth, keep out the chuck holes in order that we can save all the tires and rubber possible for Mr. Jeffers at his special request.

#### Indiana Lets Surface Treatment to Contract

From S. C. Hadden, Chairman, Indiana Highway Commission:

The State Highway Commission received bids in April for the surface treatment of 470 miles of state roads to protect the road and maintain traffic.

This maintenance program is requiring 3,500,000 gallons of bituminous materials and more than 150,000

tons of aggregates. Contractors bidding on this work based their proposals on furnishing and applying the bituminous materials and upon furnishing and spreading or furnishing and stocking the aggregate materials.

As a means of expediting the work, the program has been divided into seven contracts, each including from 50 to 80 miles of state highways. With the exception of the Seymour state highway district where there are two sets of projects, work in a state highway district has been included in a single project.

#### Spring Worse Than Usual in Wisconsin

Wisconsin State Maintenance Engineer Wm. Hoenig, says:

This spring break-up is worse than usual and necessarily requires more sandy materials and labor and equipment to carry traffic than with a normal break-up, but it is not as bad as a spring break-up as two years ago.

As far as the expenditures are concerned, our State Trunk Highway System is being maintained the same as always, to take care of traffic wherever possible. As far as the county and local roads are concerned, again there are more break-ups this spring and therefore more funds will be expended than last year. The full 10,000 mile State Trunk Highway System will be maintained.

#### Arizona Must Spend More

Writes Bernard Touhey, Arizona State Highway Engineer:

Our maintenance needs this spring are heavier than in average years, as there are many sections of highways that would have been reconstructed except for War restrictions, and these sections now require intensified maintenance.

We plan to spend \$1,440,000.00 for maintenance on the State System in 1943, as compared to \$1,200,000.00 in 1942, an increase of 20%.

The mileage of different types of road to be maintained are:

|                           | Miles |
|---------------------------|-------|
| Dual P.C. & Bit. Concrete | 29    |
| P.C. Concrete             | 116   |
| Bituminous Concrete       | 61    |
| Bituminous Penetration    | 26    |
| Mixed Bituminous          | 2,180 |
| Bituminous Surf. Treated  | 388   |
| Gravel                    | 301   |
| Graded (not surfaced)     | 397   |
| Unimproved                | 180   |

Total 3,678

On this maintenance we expect to use 300,000 gallons of emulsified asphalt and 600,000 gallons of cut-back asphalt, and a small amount of cement,—200—300 barrels. We are carrying on customary maintenance. Of course, we use MC Cutback Asphalts in place of SC road oils.

#### South Carolina—Fair Shape

W. K. Beckham, South Carolina State Maintenance Engineer, writes:

Maintenance expenditures and personnel have been reduced during the past year just about as far as is possible and still maintain the roads in minimum serviceable condition. Men employed are 43% less than during April of last year. The expenditures for all maintenance purposes are now at the rate of about \$2,000,000 a year.

In general, our highways are now in a satisfactory condition except on a few sections where there is concentrated heavy truck traffic. It will be necessary to do more patching on these particular routes during the next few years than in the past.

Over a ten-year period—until the time it was necessary to reduce our maintenance expenditures and maintenance forces—this Department carried on every season a regular bituminous retreatment or resurfacing program. Hence most of our bituminous surfaced roads were in good condition when the regular retreatment program was curtailed last year; and fortunately we have not yet had any severe weather to do any



Highway No. 6 near Breien, North Dakota, April, 1943



great damage to our roads since the war. It is hoped that we can pass through another year or two without having a regular retreatment program and without very serious damage.

However, it should be borne in mind that unless we can carry on limited work (preventive maintenance) we are apt to be faced with a situation where extensive maintenance work will be necessary to keep the roads open, or be faced with a breakdown in our motor vehicle transportation facilities.

### Minnesota Aided by Dry Spring

From C. L. Motl, Maintenance Engineer, Minnesota Department of Highways:

Minnesota has not suffered seriously in any respect and if conditions in the future are no worse than they have been in the past, then I can see nothing to get concerned over.

Our maintenance needs this spring seem to be less than in previous years. We have had a tough winter, but in contrast to this we have had a very favorable spring so far and we, therefore, feel that our repair bill will be less than in previous years. We do seem to have some increase in traffic in the heavier weight brackets which is causing us some difficulty, but this is not too serious.

There is one thing that might be emphasized and that is that the federal authorities, whoever they may be, might well place more emphasis on and exert a little more effort in seeing that municipalities, etc., are provided with repair parts so they can keep their equipment in operation. If this could be done, then the problem of equipment would be solved.

Minnesota is situated a little different than perhaps most States engaged in extensive war activities, in that our large plants engaged in the manufacture and production of war materials are concentrated quite largely in two small areas; and furthermore, the State is not subjected to very much cross-country heavy (war activity) hauling. We have good compliance with the new speed and gasoline rationing regulations and, therefore, our traffic is considerably below normal in both these respects.

Our planned budget for maintenance for the calendar year 1943 is expected to be down about 20 per cent from the calendar year 1942. This planned reduction is not because there were not sufficient funds available, but because it was felt that for the year 1943 all maintenance operations not essentially needed should be deferred. With the traffic driving at slower speeds and with the volume

down perhaps 40 per cent, some of the so-called traffic services are being curtailed, as well as some of the heavier type of maintenance projects that were ordinarily carried on each year. With the construction program practically closed down, a considerable saving is effected in the fact that no detours have to be prepared and specially maintained around new construction projects.

We are doing practically no maintenance work that is ordinarily considered as a betterment, and we have not asked for approval on any projects of this type. Our maintenance work is concentrated on preserving conditions as they are and on carrying out an extensive patch work program, particularly on bituminous surfaced roads and to some extent on concrete roads. Our estimated requirements for bituminous materials will be about 6 million gallons; for calcium chloride about 3,000 tons; and some cement will be needed for patching breaks in concrete roads.

In preventive maintenance, we have largely followed recommendations of federal agencies relative to tire care, special attention to motorized equipment, reduction in the use of cars, etc. We are, of course, using the bituminous specifications set up by the federal authorities.

The Minnesota Highway Department is setting up an information bureau on municipally owned and operated equipment, through which bureau it hopes to keep all governmental units within the state advised as to where they might be able to rent equipment from or rent out equipment to other governmental subdivisions, so that greater utilization can be realized out of the equipment that is available. This is in line with recommended pooling of equipment urged by federal authorities.

### Massachusetts Reports Heavy Truck Traffic

J. E. Lawrence, Maintenance Engineer, Massachusetts Department of Public Works, reports:

Although we have undergone a severe winter in this section, our maintenance needs do not appear to be much more than following an ordinary winter. Traffic in this state has always been heavy and the reduction in passenger car traffic is about offset by the increase in heavy trucking. The reduction in periodic surface treatment last year is showing its effect and it appears that when bituminous material becomes available in greater quantity a considerable amount of surface treatment work will be necessary.

The maintenance and snow removal

allotment for 1943 is about \$2,800,000. This is slightly lower than the appropriation for 1942 and is due to the reduction in labor and the purchase of new equipment. We are anticipating surface treating approximately 160 miles if the bituminous material is available.

Funds for state and town road maintenance have been one-sixth.

The department proposes to use approximately 351,000 gallons of asphalt, 616,000 gallons of tar and 45,000 pounds of cement for maintenance work on state highways this year. We also use slightly over 4,000 tons of sodium and calcium chloride, using about equal amounts of each in connection with treatment of icy pavements.

In regard to preventive maintenance, this department is trying to make the most of the material and equipment that we have on hand or are able to obtain. Periodic inspection of maintenance equipment and immediate action on minor repairs help to reduce more expensive repairs at a later date. The department is salvaging broken parts and building up worn parts, such as shafts and wheel hubs, by means of a spray welding outfit. (See *ROADS AND STREETS*, April, 1943, p. 75.) Roadside development has been confined to the mowing of existing grassed areas.

The restrictions on the use of bituminous materials has required a reduction in the amount of periodic surface treatment work. Only those roads which required sealing over the entire surface area are treated. This reduction from our normal surface treatment program has required extensive paint patching of large areas in order to retard deterioration and seal short sections of surface. The use of stockpiled pre-mixed bituminous patching material has resulted in the prompt and economical treatment of these conditions before the holes become larger.

Where critical material is involved we have substituted non-critical material wherever possible. Specifications have been changed in some cases to provide substitute materials.

### Mississippi—Better Weather

A. J. Yates, Jr., Engineer of Maintenance, Mississippi Highway Department, reports:

Mississippi has been fortunate in one respect. We have had a very mild winter with only one short freeze. Winter and spring rains have totaled several inches under average.

Total traffic volume is off considerably. 1942 traffic was 25% under 1941, and 1943 to date is 37% under the

(Continued on Page 89)



# Some Common Geological Terms For Engineers

By D. G. RUNNER\*

Washington, D. C.

## A

**Abney Level**—A hand level with a clinometer attachment.

**Abyssal Rocks**—A general term for rocks of the major intrusions.

**Acid Rocks**—A term applied to certain igneous rocks carrying a high percentage of silica, about 66 per cent.

**Acidulous Water**—Mineral water charged naturally with carbon dioxide.

**Acline**—Beds of rock without a dip.

**Aggradation**—The natural filling up of the bed of a water-course by the deposition of sediment.

**Agonic Line**—The line of no magnetic declination.

**Alabaster**—A compact fine-grained gypsum, white or delicately shaded.

**Alkali-Flat**—A sterile plain, containing an excess of alkali, at the bottom of an undrained basin an arid region.

**Alluvial Cone**—A fan-shaped deposit of detritus formed by a stream at the mouth of a ravine.

**Alluvial Fan**—A sloping, fan-shaped mass of loose rock debris deposited by a stream at the place where it emerges from an upland into a broad valley.

**Alum Earth**—An argillaceous or clayey rock containing pyrite and largely impregnated with bitumen.

**Alumina**—Oxide of aluminum,  $Al_2O_3$ .

**Alum-Shale**—A shale impregnated with alum. The alum being due to the action on sericite of sulphuric acid produced from pyrite.

**Amorphous**—Without form. Usually applied to minerals having no definite crystalline structure.

**Andesite**—A volcanic rock composed essentially of the lime-soda feldspars together with one or more iron minerals such as biotite, hornblende or pyroxene.

**Anhydrous**—Lacking water, especially water of crystallization.

**Anthracite**—A hard, black lustrous coal containing 85 to 95 per cent carbon as against 70 to 85 per cent in bituminous coal.

**Aqueous Rocks**—Sedimentary rocks.

**Argillite**—A clay slate.

**Arkansas Stone**—A novaculite used as an oilstone.

**Artesian Water**—Ground water that has artesian pressure head.

**Ash-Bed**—A deposit of volcanic ashes.

**Asphaltum**—Mineral pitch. Asphalt.

**Ayr Stone**—A fine-grained stone used in polishing marble.

## B

**Ball-Clay**—A plastic white-burning clay used as a bond in chinaware.

**Basic Rock**—A term rather loosely used to mean an igneous rock containing less than 55 per cent silica.

**Bay Salt**—The large crystalline salt of commerce, especially that obtained from sea water by evaporation.

**Bedford Limestone**—A light-colored oolitic limestone from Bedford, Indiana.

**Benches**—A name given to ledges of all kinds of rock that are shaped like steps or terraces.

**Binocular Hand Level**—A hand level with two sighting tubes.

**Bitter Earth**—Magnesia.

**Blackband**—An earthy carbonate of iron, accompanying coal beds.

**Blackjack**—A dark variety of zinc blende.

**Blind Creek**—A creek that is dry except in wet weather.

**Blind seams**—Incipient joints.

**Blossom**—The oxidized or decomposed outcrop of a vein or coal bed.

**Bone**—Slaty or argillaceous coal.

**Bort**—Rounded forms of the diamond with rough exterior.

**Boulder Clay**—A tenacious unstratified deposit of glacial origin.

**Breccia Marble**—Any marble (rock) composed of angular fragments.

**Brimstone**—A common name for sulphur.

**Brown Hematite**—Limonite.

**Brownstone**—A dark brown sandstone from quarries in the Connecticut River valley.

**Brown Umber**—A brown earthy variety of limonite.

**Butte**—A conspicuous isolated hill or small mountain, especially with steep sides.

## C

**Cachement**—Drainage basin, or drainage area.

**Calcareous**—An adjective applied to rock containing calcium carbonate.

**Calcareous Tufa**—A spongy porous deposit of calcium carbonate.

**Calcine**—To expose to heat; to roast.

**Calcium Chloride**—A compound,  $CaCl_2$ .

**Calcium Sulphate**—Gypsum.

**Calc-Sinter**—Limestone deposited from springs and waters containing it; travertine.

**Calc-Spar**—A synonym for calcite.

**Caldera**—A broad relatively shallow volcanic basin.

**Carbonaceous**—Containing carbon.

**Carbon Black**—A name for lamp black.

**Carborundum**—A crystalline compound,  $SiC$ .

**Carrara Marble**—A general name given to all the marbles quarried near Carrara, Italy.

**Catchment Area**—The entire area from which drainage is received by a reservoir, river or the like.

**Charco**—A watering place in an alluvial plain in the desert.

**Cinder Cone**—A volcanic cone composed of scoria.

**Cirque**—A steep-walled, amphitheatral recess in a mountain side.

**Clastic**—A descriptive term applied to rock formed from the fragments of other rocks.

**Clayband**—Argillaceous ironstone in thin beds.

**Clay Gouge**—A thin seam of clay separating ore, or ore and rock.

**Contact Bed**—A bed lying next to a formation of different character.

**Continental Deposits**—Deposits laid down on land by rivers, wind, glaciers, etc., in contrast to sediments laid down in the ocean.

**Coral Limestone**—A limestone composed of coral fragments.

**Crop Out**—To be exposed at the surface.

## D

**Datum**—Any position or element in relation to which others are determined, such as datum point, datum line, datum plane.

**Day-Coal**—The upper stratum of coal nearest the light or surface.

**Declination**—The variation between the magnetic and true north.

**Deflation**—The removal of loose material by the wind, leaving the rock bare to the continuous attack of the weather.

**Degradation**—The general lowering of the surface of the land by erosive processes.

**Delta**—An alluvial deposit at the mouth of a river.

**Denuded**—Rock exposed by the action of erosion.

\*Co-author with Lt. Col. Victor J. Brown of the book "Engineering Terminology," published by the Gillette Publishing Co., Chicago, Ill. See page ....  
Courtesy Lambertville Trap Rock Co.

**Detrital Rocks**—A rock made up of the debris of other rock.

**Diabase (Trap rock)**—A basic igneous rock usually occurring in dikes or intrusive sheets, and composed essentially of lime-soda feldspars and augite with small quantities of magnetite.

**Divide**—The watershed or height-of-land from which the heads of streams flow in opposite directions.

**Dogtooth Spar**—A variety of calcite ( $\text{CaCO}_3$ ).

**Dolomitic Limestone**—A limestone containing dolomite, but in which  $\text{CaCO}_3$  is dominant over  $\text{MgCO}_3$ .

**Dornick**—A small rock or boulder.

**Drainage Level**—The level at which surface streams flow.

**Draw**—A valley or basin.

**Dries**—Seams in the rock.

**Drift Deposit**—Any accumulation of glacial origin.

**Drip Stone**—A porous stone for filtering water.

**Dunes**—Hills or ridges of aeolian sand.

## E

**Earth Fall**—A landslide.

**Effusive**—A term applied to igneous rocks poured out of a vent or fissure in the earth.

**Egg Stone**—Oolite.

**Eolian Deposits**—Wind-deposited sediments, such as loess.

**Epoch**—A unit of geologic time.

**Era**—The largest unit of geologic time.

**Erratic Blocks**—Rounded erratic blocks are called boulders.

**Eruptive**—The name given to rocks that have burst through other rocks in a molten state.

**Estuarine**—Appertaining to an estuary or the mouth of a river.

**Extrusive**—A term applied to those igneous rocks which have cooled after reaching the surface of the ground.

## F

**Fat Coal**—Coals containing much volatile oily matter.

**Fault Block**—A body of rock bounded by faults.

**Fault Vein**—A mineral vein deposited in a fault fissure.

**Ferriferous**—Containing iron; iron-bearing.

**Ferruginous Sandstone**—A sandstone rich in iron as the cementing material, or as grains.

**Ferrum**—Iron, for which the chemical symbol is Fe.

**Fetid**—Having the odor of sulphuretted hydrogen. Some limestones are fetid.

**Firn**—A Swiss name for the granular, loose, or unconsolidated snow of the high altitudes before it forms glacial ice below.

**Firth**—A narrow arm of the sea.

**Fissile**—Splitting into thin, more or less papery sheets.

**Flags**—Thin, even beds of rocks which readily separate along the plane of deposition.

**Flagstone**—A thin-bedded sandstone.

**Float**—Loose fragments of rock.

**Fluviatile Deposits**—Sedimentary deposits laid down by a river.

**Folding**—Deformation of rocks, causing bending.

**Fool's Gold**—Pyrite,  $\text{FeS}_2$ .

**Fossil Flour**—Infusorial earth.

**French Chalk**—Fine granular talc, soft enough to be used as chalk.

## G

**Galena**—Lead sulphide,  $\text{PbS}$ .

**Gang**—German word for dike.

**Gangue**—The mineral associated with the ore in a vein.

**Gem Stone**—A precious stone; a mineral suitable for cutting as a gem.

**Geodesy**—The science and art of measuring portions of the earth's surface by triangulation and astronomical observation.

**Geological Horizon**—Rocks of one geological age.

## H

**Halite**—Native salt; sodium chloride.

**Hand-Level**—A small level provided with a sighting tube, which in some types carries a telescope.

**Hanging Valley**—A valley the floor of which is notably higher than the level of the valley or shore to which it leads.

**Hard Coal**—Same as anthracite.

**Heading**—A collection of close joints.

**Heavy Spar**—Synonym for barite ( $\text{BaSO}_4$ ).

(Continued on page 92)

# Concrete Skin-Patches Used Successfully on New Jersey Concrete Roads

NEW JERSEY'S 1,666 miles of state highways include more than 1,350 miles of concrete, many, many miles being of multiple-lane construction. While these pavements are in generally excellent condition, some worn or scaled areas have occurred, traceable in some instances to the use of a faulty sand aggregate, which situation has long since been corrected. Full depth concrete patching of older pavements has been done with fairly satisfactory results, but vibration of the extremely heavy traffic concentrations with numerous buses and very large trucks has often caused patches to separate from the surrounding pavement.

Some fifteen years ago, to repair an area of pavement damaged by a burning gasoline truck, a thin "skin patch" of concrete was tried. Since then other burned areas have been similarly capped over, and a considerable volume of such patching done as part of general maintenance.

The patches, which usually vary in depth from zero to 2-in., are placed as follows:

Pavement areas where scaling has progressed into the coarse aggregate

is roughened and washed clean, sometimes using acid; then a very dry, stiff, rich mix of concrete made with normal portland cement and graded aggregate up to  $\frac{3}{8}$  or  $\frac{1}{2}$ -in. size is thoroughly tamped in place. The concrete is thoroughly floated with a wood float, broomed, and cured under wet burlap. Concrete is mixed by hand in the small batches required. The work is done by the regular maintenance crews. One man who is experienced in this type of patch moves around over the state to see that the above procedure is rigidly followed out.

This type of patch is still regarded as somewhat experimental. Some failures have occurred when rules were not followed carefully, but most jobs so far have stood up very well.

A. W. Muir is New Jersey state superintendent of maintenance.

[Editor's Note: Similar thin concrete patches have been used in Ohio. One instance, reported as successful, is located just outside Akron at the site of a burned truck, according to Bill Wardman, Ohio highway department asst. division engineer at Ravenna.]



# Pumping Joints Sealed by "Mudjacking" Asphaltic Cement

By H. D. METCALF

Chief Engineer, Bureau of Maintenance,  
Ohio Department of Highways

**I**N SPITE of careful attention to joint design and construction on its concrete roads, the Ohio department of highways has had its share of "pumping joints," followed by progressive deterioration.

Little trouble has occurred under ordinary light traffic, but extremely heavy, fast trucking on some routes has often brought on the condition within a few years. In wet weather water can be observed to spurt in the air (several feet in some instances)

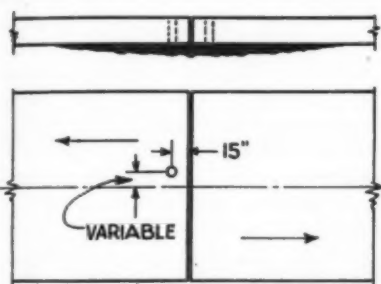


Fig. 1. Present practice is to force bitumen through a single hole if possible

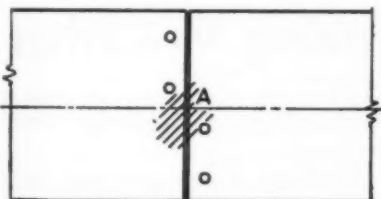


Fig. 2. Experimental 4-hole pattern, since discarded

from joints or cracks as heavy vehicles pass over.

The first evidence of trouble is a tell-tale discoloration at joints in wet weather. Along the center-line there will be an occasional dark smudge, where water has squeezed up through the crack and slightly emulsified some of the center-stripe bitumen. At transverse expansion joints, slight clay stains will show in the spring in the second or third year after construction, later growing to large and stained areas and slab breaks four to six feet from the joint or crack.

## How Trouble Is Stopped

Extensive experiment had shown that joint trouble can be forestalled, or progressive deterioration stopped in early stages, by sealing the joint from beneath with asphalt cement pumped through a hole in the slab.

The procedure is similar to that of mud-jacking, but the objective is different in that no general raising of slab area is involved. Joints at which pumping tendencies have begun to occur may be perfectly level when not carrying loads. A step-off of perhaps an eighth of an inch may have occurred at some older joints, or a lesser amount detectable only by close eye or finger touch inspection.

After some experimentation the fol-

lowing general procedure has been adopted:

1. A hole 2½ in. in diameter is drilled in the pavement at a point about 15 in. from the joint, on the far side in the direction of traffic and near the center of the roadway or of the area in which leakage is in evidence. (See Fig. 1.) The hole is drilled with a jackhammer. A smaller 1½ in. diameter hole was later used for the purpose.

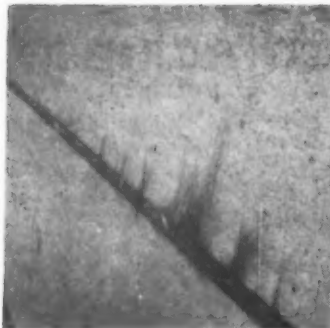
2. A pipe fitting of special design is inserted tightly into the hole, as shown in the photograph. This fitting includes a protective metal head



Typical joint conditions which the asphalt seal is used to alleviate. As the far side of the joint settles slightly the slab undergoes an increasingly violent "springboard" action as the loads cross the joint, commonly resulting in a transverse crack 5 to 9 feet back, as shown here. Early subgrade seal treatment would have prevented or retarded this deterioration.



Showing special pipe fitting used in pumping asphaltic material under the slab. The cap protects the threaded pipe connection while driving the fitting tight. The pronged tool is for prying the pipe out



Note the fissures at the slab edge, tell-tale evidence that water and mud geyser up here when trucks pass over



Clay stains from ground water squeezed out under traffic—tell-tale sign that slight pumping action has begun along the center joint of this recent pavement. Progressive deterioration can be nipped in the bud by under-sealing

which is placed over the top to permit driving it tight with a mall.

3. Water accumulated under the pavement around the joint is then blown out with compressed air. Air is shot in until water bubbles out of the joint and out of pockets in the shoulders.

4. After the free water and thin mud have been blown out, then comes the pumping of bituminous material to quickly fill the void and seal the joint or crack. Pure 50-penetration asphaltic cement is used at 275-300 deg. F. A typical joint in a 20 or 22 ft. pavement will require from 20 to 40 gals. ( $2\frac{1}{2}$  to 5 cu. ft.) of material. The asphalt cement is forced in until material begins to show at the edge-pockets, but pumping is stopped promptly before any appreciable general raising of the pavement takes place. By running the fingertip across the joint the inspector can tell the instant the low side has begun to raise, and when it has been restored to proper level.

5. The pump fitting is then removed, using the special prying tool shown in the photo, and the hole filled with a tight wood plug.

Several questions might be raised as to this method of sealing joints. One is on the cost. The cost per joint has averaged only about \$5, slightly more or less depending on the number treated on any given job. Quantities are less than those involved in mud-jacking because the pavement is not raised. The possible disadvantage of leaving an unsightly bituminous stain was overcome by treating the pavement around each hole with calcium chloride.

#### 1000 Joints on One Road

About 1,000 joints were water-proofed by the above general method on State Route 16, east of Newark, Ohio, and 100 joints or cracks on a section of the National Turnpike (U. S. 40). Also about 100 on the very heavily traveled Route 20, where

additional joint sealing is planned for the present year.

The drilling pattern shown in Fig. 2 was tried on earlier work, but was soon discarded for several reasons. It was found that hot asphalt could be forced longer distances along the slab than was expected; hence four holes were reduced to one or two at a saving. Also a single blow point was more successful in removing water than four, which tended to leave water accumulated at the center area A.

The present practice is to try with one hole, as in Fig. 1. Then if this doesn't do the job, check the point

where extrusion of black material ends, and drill a second hole to reach the remaining area.

Except for the small pipe fitting no special equipment is needed. The crew uses an ordinary compressor and bituminous pressure distributor, the material being heated in the distributor or received partially heated from a nearby refinery.

#### Stitch in Time

As to results, almost invariably the leakage or "pumping" has been stopped. While it is too soon to gage the length of time that relief will be provided, the waterproofing job has remained complete in the interval of one to two years since application. The small cost is considered to be one of our best preventive maintenance investments.

A movie was used to explain and sell this method at our maintenance schools this spring, and bituminous pumping of joints will be a steady part of our wartime maintenance on older concrete roads now being pounded by heavy war hauling.

H. D. Metcalf is chief engineer of maintenance in the Ohio Department of Highways, with S. O. Linzell in charge of the developments described above. H. G. Sours is Ohio Director of Highways.

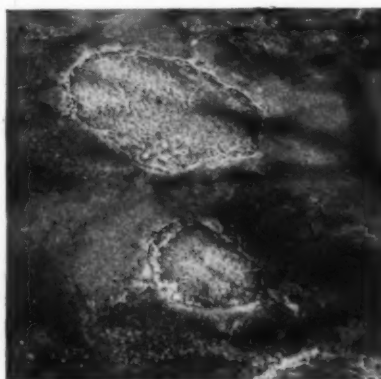
## Asphalt Street Concrete-Patched in Freezing Weather

In order to catch surface breaks at an early stage and forestall further deterioration, the Albany, N. Y., street department used emergency concrete-patching methods on five blocks of State Street through a close-in semi-residential area. The old pavement is sheet asphalt on a concrete base. Early in March, while ice still filled the gutters and the temperature fluctuated above and below freezing, some 150 small areas were patched, using a rich, dry mixture.

The concrete was mixed by hand in small batches. "High-early" cement was used.

While the street was closed for 20 hours, a few delivery vehicles got through and several patches were tire-marked before hardening.

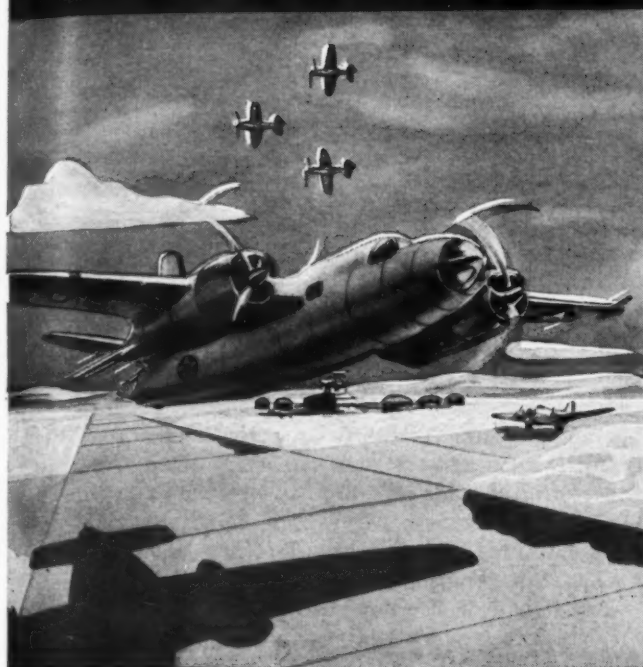
One patch was mixed with lamp black to match the dark surface, as an experiment looking toward the possible necessity of further patching of asphalt with concrete.



Left: Typical small "stitch in time" emergency concrete patches in Albany sheet asphalt street, placed early this March. Right: One of many durable concrete patches made a year or more previous



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LL-98

# Editorial

## TELL 130,000,000 PEOPLE ABOUT THE POST WAR ROAD PROGRAM

**A**T THE American Road Builders annual meeting in Chicago, the equipment manufacturers section was shown by a highly successful advertising man how to speed highway development in Latin America. This gentleman, an outstanding figure in Mexican, Central American and South American advertising, propounded a simple, basic fact: If you want to speed the Good Roads idea south of the border, take your story to the people as well as the engineers and public officials of these countries.

Reaching the Latin-American people probably can be done only through some kind of group or association effort. Such a campaign should be given full consideration. It will hasten the development of this tremendous market for American equipment and materials, and if properly done would help much to foster friendship and mutual understanding between our southern neighbors and ourselves.

But the selling of the Good Roads idea should begin all over again at home. And what a product awaits selling! Anyone who heard the Upham-Lamson post-war study explained at the recent Chicago meeting could not help but be stirred by the plan's boldness and size and impressed by its soundness. Our industry should be easily sold, since the plan would assure roadbuilders leadership in national post-war affairs.

But how about John Q. Public? The thirty million folks who still own cars and trucks with four usable tires are going to miss a lot of vacation trips this summer. But their dreams of the future are there. They see a golden renaissance of motor travel in their personal gazing globes. They also share with their congressmen a slumbering but deep-rooted fear of the specter of possible post-war unemployment. A \$3,000,000,000 a year post-war road building program hence has not only one but two sure-fire "sales appeals." What the program encompasses, why it is needed, what it will do for business and the community, how it will affect every hearthside, its meaning in terms of future security and freedom—these are some of the things that need to be told. It's a job of interpretation, a job that will need the cooperation of forward looking newspaper editors.

Enacting enabling laws, acquiring rights-of-way and preparing plans take time. So does moulding of public opinion, especially on such a complex and seemingly-controversial subject as a vast public construction program.

The road building industry should unite in this job of public education, and the good work ARBA and others have done in this direction be stepped up, and soon.

## ROAD MAINTENANCE FROM HERE ON

**M**ILITARY and government leaders are right in deciding that not a pound of materials or a man-hour of effort should be expended on road maintenance beyond that needed to see the war through.

But how much is that need? What is the minimum level of get-along maintenance?

News from many fronts indicates that the maintenance job is being skimmed in some areas to the point where serious trouble is in store. Ray Tilly of Sangamon County, Illinois, knows the treachery of rich black cornland soil, and he isn't kidding in his article in this issue when he foresees that half the local roads in his county will be impassable in wet weather next winter. Not joking either are several state highway maintenance chiefs, whose comments in another article are threaded with concern for the future.

All types of roads are kicking up their heels. In northeastern Ohio, the Detroit area and other industrial areas, maintenance needs are up rather than down. Hundreds of miles of pavements will have to

be repaired extensively or rebuilt soon; the combination of a bad winter and the heaviest, fastest trucking in history has been too much for them.

Will the present year see higher preference ratings for materials, and a more essential status for road workers? Will federal funds for aiding essential maintenance be made available where local funds won't stretch? Much depends on how promptly and effectively road and street officials present the true picture of their needs. If vital highway or street service is seriously threatened anywhere within your jurisdiction, it is your patriotic duty to demonstrate this fact and do it fast, with facts and photographs.

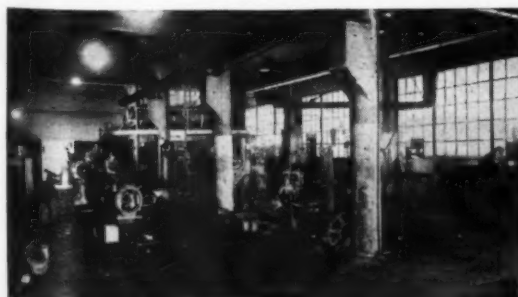
Deciding how much materials to ask for in these times calls for some fine judgment. Deal candidly with your WPB and other war-agency officials; they too are trying to do a job. And keep your congressmen informed. Washington finally must depend on you to know what should go for bullets and what for roads.





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- 7 **REPAIRS AND MAINTENANCE** — Quick, efficient repairing by skilled, factory-trained mechanics, using the right tools and genuine parts.
- 8 **USED EQUIPMENT** — In some instances, good rebuilt construction equipment may be available.
- 9 **RENTALS** — Good used equipment may be available for temporary emergencies.
- 10 **EQUIPMENT EXCHANGE** — Information center on used equipment available in territory.

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## ARBA Annual Meeting

(Continued from Page 47)

missioner of public works, Toronto, Canada; E. A. Miller, supervisor of maintenance, Rochester, N. Y.; Robert A. Mitchell, traffic engineer, dept. of public safety, Philadelphia; G. M. Shepard, city engineer, St. Paul, Minn.; DeWitt M. Colburn, deputy com., dept. of public works and engineering, Dearborn, Mich.; H. C. Whitehurst, director of highways, Dist. of Columbia.

**Highway Contractors' Division:** President is James J. Skelly, James J. Skelly Co., Media, Pa.; Vice president, Charles W. Smith, Smith Engineering & Construction Company, Pensacola, Florida.

Directors for 1946 term are Robert P. Bayard of Johnson, Drake & Piper, Inc., Freeport, N. Y.; S. B. Brinson of Ebersbach Construction Co., Tampa, Fla.; A. E. Finley, president, North Carolina Equipment Co., Raleigh, North Carolina; E. E. Hoebel, executive secretary, Wisconsin road builders' association, Madison, Wisconsin; Art Hollinger, Hollinger & Davidson,

Akron, Ohio; Edward W. Porath, Julius Porath & Sons, Detroit, Mich.; A. G. Rolfe, president, McGuire & Rolfe, Inc., Washington, D. C.; W. A. Young, president, Cornell-Young Company, Macon, Georgia.

Directors at large elected for coming year, are L. G. Arnold of L. G. Arnold, Inc., Eau Claire, Wis.; W. C. M. Butler, President, Central Pennsylvania Quarry Stripping and Construction Co., Hazelton, Pa.; Henry Fowler of John A. McGarry Co., Chicago, Ill.; E. W. Grannis, contractor, Fayetteville, N. Carolina; George E. Haggart, Haggart Construction Co., Fargo, N. Dakota; Alex Hancock, president, Alex Hancock Construction Co., Mobile, Ala.; Robert N. Kinnaird, executive secretary, Mississippi Highway Contractors' Assn., Jackson, Miss.; Abner P. Lawton of Lawton Construction Co., Providence, R. I.; Polk Smartt, president, Polk Smartt Paving Co., Chattanooga, Tenn.; Walter Toebe of Walter Toebe & Co., Munising, Michigan; C. H. Wheatley of Americus Engineering & Contracting Co., Americus, Georgia.

## 3-Billion-a-Year Road Program to Help Win the Peace

[Central subject of consideration at the recent ARBA Annual Meeting, the 64-page study prepared by Charles M. Upham, Engineer-Director, and Daniel R. Lamson, Research Engineer, for the association's post-war committee is highlighted herewith. The complete report can be obtained from the American Road Builders Association, International Building, Washington, D. C.—Editor.]

Since the beginning of the economic collapse which occurred in the early thirties, the American Road Builders' Association has carried on much research work concerning the effects of the highway construction program on the national economy. Conclusions have been based on these studies, as well as on information obtained from many agencies, governmental and otherwise.

The work undertaken was the outgrowth of the lesson learned from the depression years—that the highway construction program could no longer be based on the demands of transportation alone, as it had been in the prosperous twenties. It was definitely proven that construction activity had a far-reaching effect on the entire national economy; that the durable goods industry was largely based on it; and that industrial stabilization, full employment and high national

income were existent when and only when construction activity was at a high level.

The absence of an adequate planned postwar highway program will result in a situation similar to that of the early thirties, when the collapse of the construction industry directly and indirectly accounted for the greater percentage of the 13,000,000 people unemployed. Improvised work proved unsuccessful either for the relief of unemployment or as an economic stimulant and can hardly be relied upon to improve a post-war situation involving the shifting of 35,000,000 persons or more from wartime to peacetime activity.

### Actual Designing Should Start Now

Highway construction, while providing needed facilities, offers an excellent opportunity for the absorption of man power. These objectives can be reached only by having available a shelf of projects, complete with plans, specifications and cost estimates ready for contract at the end of the war. Neglecting to do this would result in the wasteful expenditure of funds for improvised relief work.

If the war should end in the near future, one-half of our working population, plus millions of our military

(Continued on Page 81)

# High School Boys Helped Repair Springfield's Streets

**C**ITY engineers up against it this summer for labor on street repairs will be interested in a tip from City Engineer Lewis H. Lush, of Springfield, Illinois. Last year he planned a program of needed street work in such a way as to give employment to husky high school boys. All the common labor on several miles of bituminous patching and resurfacing was done by about 40 boys.

Local high school officials cooperated on the project. Some boys were glad to work for the wages; others didn't especially need the money but pitched in as a means of training for fall football or for military service. Since all street work in Springfield is with union labor, arrangements were made with the local union to take the boys in at nominal dues, as apprentices. Most boys received 90 cents for common labor. A few earned \$1.10 as rakers, or \$1.50 an hour for luting.

Much of the program involved placement of rock asphalt on arterial or residential streets. As a typical example, the 25 to 30-year-old asphalt on Lincoln, a residential street, was resurfaced by putting down 1½ in. of binder consisting of RC-3 asphalt, crushed stone and Kotal, followed by 1 in. of rock asphalt wearing course. Binder was mixed in a concrete mixer, hauled, dumped and spread by hand, and rolled with a 3-ton roller, the only size available. Incidentally, an experienced union roller operator and finisher were included in each crew.

The topping material was heated in an old boiler, raked and luted with

triangular, long-handled lutes running on 1½-in. gauge strips lying on the binder, then rolled to 1 in. thickness.

About \$200,000 expenditure from



Lewis H. Lush

motor fuel funds and \$50,000 of City funds were involved in the program.

## 1943 Program

This year Springfield is continuing with a two-fold maintenance job. One part will consist of patching similar to that described above, designed to get pavements through the war with least materials and labor. Bids are being advertised for an extensive program involving center-zones, scattered patching and a small amount of general resurfacing with leveling or binder course followed by a thick rock

asphalt topping. Some ½ to 1 in. rock asphalt topping is planned alone as a surface seal, especially for patches on brick paving.

Also is the question of what to do with 70 miles of unpaved streets. Some of these streets have been oiled, others are untreated earth or gravel. The oiled sections suffered extensive damage last winter. MC-5 asphalt will be used for stabilization as material allocation permits.

Frank Lock is commissioner of streets and public improvements of Springfield.

## A. E. D. June Membership Meeting Not to Be Held

The Associated Equipment Distributors will forego the usual mid-summer membership meeting scheduled for June, 1943.

In order that important, pressing, problems of the industry may be discussed, streamlined meetings of the Board of Directors and the Board of Governors will be held at the Edgewater Beach Hotel, Chicago, June 6, 7, 8 and 9.

Conferences of distributors in each of AED's twelve regions were held during the months of April and May. The country was divided into three territories with each of the three vice-presidents attending the conferences in each territory. President Ed. P. Phillips started a tour of the western states on April 15th to return to Richmond, Va., the last week in May. He attended conferences in the western and southern territories.



A rock asphalt resurfaced street, built with H. S. boy labor.



Center-zone patching, as done to protect a maximum number of old streets with available materials.





Of every 10 Mack trucks built ten years ago—7 are still doing duty! Here Peter Helck sketches a "baby Mack" at dock-side.

## ITS MIDDLE NAME IS . . . WORK!

Today's Mack trucks range in size from tough little one-tonners to the biggest Prime Mover in Uncle Sam's Army. But big or little—if its last name is Mack, its middle name is *work*!

For 43 years, the world has watched the way Mack trucks wade into the toughest jobs in trucking. That is why the phrase "Built like a Mack truck" is a part of our language.



Mack Trucks, Inc., Long Island City, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J. Factory branches and dealers in all principal cities for service and parts.



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ROADS AND STREETS, May, 1943

# Getting Millions of 'New' Workers\*

By HALBERT P. GILLETTE

Not so long ago James F. Byrnes, economic stabilizer, announced that thenceforth it was to be the Federal administration's policy to encourage the payment of higher wages for increased output under the new 48-hour week. This means real progress both toward reduced costs of war products and increased income for war workers.

It is, in fact, a complete reversal of the previous policy of the administration, for in his press conference on April 7, 1942, President Roosevelt expressed "unalterable opposition to the piecework system during peacetime and even more so in wartime," and that he believed that, especially in wartime, workers "do not need incentives in the form of bonuses or other rewards."

In an editorial article in an engineering magazine in May, 1942, I pointed out that the most celebrated of French military engineers, Vauban, had always favored paying his sappers "on the spot at piecework rates" because their output was thus increased greatly. And I urged the President to apply the "guinea-pig experiment" of bonus payments in a few selected factories, for I estimated that at least 25 per cent could thus be added to the average worker's output.

## Finally Bearing Fruit

As early as November 10, 1941, I contributed an article to *The Times* advocating either bonus or piece-rate payments to war factory workers, giving statistical facts in support of such a policy. Additional supporting facts were given in subsequent articles of mine in *The Times*, copies of which were sent to Congressmen and other Government officials. About a year later the War Labor Board, in General Order No. 5 issued last October, gave its approval of any wage policy for "increased productivity under piecework for incentive plans," such as bonuses for individual output in excess of a prescribed standard. A recent C.I.O. booklet, indorsed by President Philip Murray, declared that such wage systems have merit. This change of heart on the part of a great union leader is the most encouraging thing that has happened, and it may be one of the reasons why there has been a similar change of heart in administration circles.

In a recent article *Newsweek* pointed out that in 1935 Russia adopted

piecework payment for coal miners in the Doubas mines that increased the daily output of a typical crew sixteenfold! To which, let me add, that prior to that an American mining engineer had opened Stalin's eyes to the efficiency of bonus payments. He had been employed to effect an increase in placer gold output. After studying the problem, he advised Stalin that no great increase could be hoped for unless prospectors were paid big bonuses for discovering new placer deposits. In short, he recommended the system of free enterprise, with rich rewards to the most successful, that had been so effective in North America. Stalin acted upon this advice, with results that were much more amazing to him than to his engineering adviser.

## Plan Needed

Last fall, in a letter to the W.L.B., the president of General Motors Corp., C. E. Wilson, pointed out that both workers and owners of war factories should be allowed increased income as a result of increased output per employee. That letter probably was an important factor in securing General Order No. 5 above mentioned.

*Newsweek* says: "The experience of workers and factories with incentive plans in this country and in Russia shows plainly that the nation has powerful resources of man power lying idle for lack of a concrete plan to utilize them. An average increase of 25 per cent (which is conservatively below the increases actually realized in many plants which have switched to incentive plans) in the production rates of America's 17,500,000 war-plant workers in 1943, for example, would be the equivalent of adding well over 4,000,000 new workers—or nearly the number estimated as needed in war industries this year."

As stated in this quotation, an increase of one-fourth in the average output of a factory worker is well below what has been attained by bonus and piecework payments. What is more, under such systems, absenteeism automatically decreases.

Payment in proportion to performance is simple justice. It is a type of honesty that is not merely its own reward but rewards both him that gives and him that takes.

\* Reprinted from *Los Angeles Times* of April 22.

## Gasoline Mileage As a Measure of Truck Economy—How To Check It

(From FWD Truck News)

Truck transportation today must get the most out of every tankful of gas . . . squeeze the last mile out of every gallon.

As a general rule, gasoline mileage is a good indicator of the mechanical condition of your truck. Good mileage indicating top efficiency, poor mileage inefficient operation. If you're not getting the mileage you think you should, weight, load, and other factors considered, here's something you can do about it.

Every FWD truck is mileage-tested at the factory and a record of the test is filed with the original chassis report. The record of the original test now filed with the chassis report of your truck contains the answer to the mileage you should be getting. Every FWD owner or operator is urged to write for this specific gasoline consumption rating which they may check and compare with their present gasoline economy.

If your operating records show gas economy on a par with the original report, give yourself a pat on the back, for this indicates that you have undoubtedly done a first class job of preventive maintenance.

If your gas economy is not up to par here's how to put new pep and operating economy back into the truck:

Check the electrical system of your truck very thoroughly, faulty ignition is a gasoline waster of the first order.

Check and clean the spark plugs or if they are badly burned, put in new ones.

Clean the air filter as well as the carburetor—a choked up air filter or carburetor bowl causes excessive gasoline waste and slows down the performance of the truck.

Avoid show-off acceleration and unreasonable driving.

Keep tires inflated—use proper gear ratios for the job at hand, keep cooling system clean, free from foreign elements, avoid excessive use of the choke, especially when starting a warm motor and above all else check your clutch adjustment (power slip-page won't help gas economy), and avoid prolonged idling of the engine when the truck is not in operation.

Needless idling of the engine has been proved by scores of large transportation companies to be one of the largest single causes of poor gasoline mileage.



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Gulf Dieselube H.D. meets U. S. Army specification 2-104A for use in automotive gasoline and Diesel engines and has been approved by manufacturers of Diesel engines for tractors and trucks. Leading builders of armored tanks are using this quality oil for lubrication of engines and transmissions.

Severe heavy-duty Diesel engine tests show Dieselube H.D. keeps engines remarkably clean and gives maximum freedom from ring sticking.

This new oil is recommended for use in bus, truck, tractor, marine, and industrial Diesel installations, as well as for other Diesel engines where manufacturers

recommend or operators desire a detergent type oil of the highest quality which is noncorrosive to alloy bearings.

Gulf Dieselube H.D. is also recommended for gasoline engines in commercial equipment where service encountered is extremely heavy and where ring sticking or lacquer formation has been encountered with previous oils.

For further information on Gulf Dieselube H.D., send the coupon below.



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ROADS AND STREETS, May, 1943



# Equipment Maintenance



## "Make It Do!"

Vermont Highway Department living up to old New England adage in its wartime equipment upkeep

By HAROLD J. McKEEVER  
Associate Editor, Roads and Streets

THE compact little state of scenic hills and vacation spots and dairy farms and industrial communities known as Vermont is traditionally the home of thrifty people. Its state highway department is living up to the tradition. In peacetime, one of its sources of pride has been the exceptionally low maintenance cost for the various types of road surfaces on the state system. In wartime, its frugal methods are standing it in good stead—particularly the good old New England "wear it out, fix it up, make it do," idea which the department has practiced for many years. If a new part or a new machine would really save money, it was purchased. But if a salvage or repair job was thriftier and just as good, few bets have been overlooked.

Highway equipment upkeep is centered in the state's machine shop and garage near Montpelier. Here 500 or so machinery units are brought in for repairing or overhauling. Although road maintenance is divided into twelve districts, it has been found more economical to bring repair work to one central shop; fourteen heavy-duty trailers are used to cart the equipment in. The heavy overhauling is done in winter, in a shop well equipped with lathes, welders, forges and general servicing equipment.

### On Self-sustaining Basis

The equipment department, under Equipment Superintendent M. E. Carpenter, operates strictly out of earn-

ings. For each unit of equipment there is an hourly, daily or seasonal "book" rental rate. This scale is charged as a bookkeeping transaction against all state highway patrol and snow removal work. And machines are rented to the towns (townships) for construction and maintenance when available. The equipment department has a consistent record for staying in the black, in spite of peak periods of expense such as during the overhaul season.

### Factory Equipment Often Modified to Meet Requirements

As is the case with other highway departments, Vermont has occasion-

ally changed or modified standard equipment in the light of experience. One example is its shoulder brooms. Several front-of-truck sweeper units have been adapted for brooming loose material from long stretches of bituminous shoulders, preparatory to re-treatment, by converting to pull-type units in order to keep the truck in front of the dust. The brooms (see Fig. 1) are rigged up under pull-grader chassis, in place of the usual scraper blade, and have given good service for several years.

### Shop-Made Trailer

When a new trailer could not be purchased recently, the men in the



Fig. 1—One way to put the broom behind the truck; mount it on an old pull-grader chassis

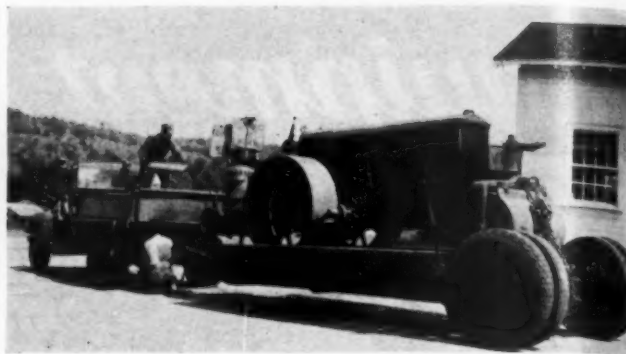


Fig. 2—Machinery trailer made in the Vermont state highway shop

machinery department designed and built a thoroughly serviceable heavy-duty semi-trailer (Fig. 2). The dual rear wheels were salvaged from a

tough grader axle, blacksmithed into an eye-shape and strongly welded to the frame with general-purpose welding rod. The rear-wheel brakes operate via an enclosed cable, using a salvaged piece of flexible preformed rope. The cable system includes an equalizer as shown. The cable end (hidden from view in photo) is attached to a lever which is operated by a piece of rope leading to the truck cab. The trailer is designed to throw one-third of the weight on the pulling truck.

#### Safety Grab Hook

Speaking of trailer draw-bars, the highway department recently settled a damage suit arising from a mishap caused by a machinery trailer breaking its chain and damaging roadside property while in transit. To forestall recurrence of such trouble, a latch-type safety hook was designed (Fig. 3) and is now used on all trailers. Valve springs from truck motors were employed as the spring elements. The eye and U parts are made from scrap steel.

Vermont also has made and used its own salt spreader units, using the design developed in New Hampshire (see R&S, April, 1943).

#### Shovel Overhauled with Wholesale Welding

In overhauling several Lorain "30"  $\frac{1}{2}$ -yd. shovels this past winter the shop men really "went to town" in applying

latest war-time salvaging ideas. Some of the jobs involved are noted as follows:

1. Crawler drive sprockets—worn or broken teeth were burned away and new teeth, forged from scrap steel, were welded on and then armored with high-carbon welding rod. Gear teeth of this unit were built up. Fig. 4 shows one of the sprockets with the welding work largely completed on sprocket teeth and gears, before machining. The worn rim path is also to be built up and ground to original radius and contour.

2. Crowd assembly unit. This unit (Fig. 5 and 6) including crowd drum and dipper stick pinion, was really in bad shape but was on the way to being good as new when the photo was taken. Cracks and breaks in the cast iron drum have been welded; gears welded up and machined; adjoining pinion surface likewise. The toughest part of this job was replacement of worn bushing with a shop-made cast iron bushing. This was done in accordance with recommended emergency practice. The bushing is welded to the drum. Fig. 6 shows this detail completed, shaft keyed and surfaces ground. All welding operations electric.

3. Common practice in most road shops now, but noted as part of this overhaul, are the electric-arc-welded dipper teeth (Fig. 7). The small teeth are from the above Lorain; the large, part of a complete set for a Bucyrus-Erie  $\frac{3}{4}$ -yd. shovel, lengthened with pieces of high-manganese steel.

4. The Lorain's drive shaft, along with worn shafts from other state-owned shovels of this make, have been built up by arc welding, then lathe-turned in the department shop. Fig. 8 shows a re-ground shaft, and a drive clutch lock with worn teeth welded and ready for machining. A half-dozen of these shafts are on hand in the stock room, as a preparedness measure.



Fig. 3—Here's a trailer grab hook that won't come loose. Designed and built at Vermont State Garage

quarter-century-old Liberty Truck. The chassis was welded together from available pieces of bridge iron. The draw-bar, one of the most important details, was fashioned from a piece of



Fig. 9—How new grader rims are reinforced before installing



Fig. 10—Vermont rebuilds worn sand-spreader—an important salvage operation





Shown above: Details of Lorain shovel overhaul

Fig. 4—Lorain "30" crawler drive sprocket—welding work done and ready for machining and grinding

Fig. 5 and 6—Read how this important, hard-to-get shovel unit was salvaged

Fig. 7—The short teeth for a Lorain were built up with hardening rod; the long teeth, for a Bucyrus-Erie, were given new ends cut from pieces of high manganese steel

Fig. 8—More Lorain parts salvaged in the overhaul—an arc welded and machined shaft; and a drive clutch lock, welded and ready for machining

The foregoing are only a few of the major salvage items in the Lorain's thorough overhaul job. It was dismantled to the "last cotter pin" in an effort to put it in perfect order and lengthen its service life.

## Other Emergency Shop Jobs

In the Vermont shop the practice today is to reinforce all new grader wheel rims before putting them in service. As shown (in Fig. 9) pieces of metal are welded at intervals all

around to help the rims withstand the extra strain of snow service.

The spinner discs of the department's 100 sand spreaders also represent quite a salvage opportunity. These discs, which are whirled through contact with a rubber-tired wheel rolling on the pavement, wear down rapidly in service. Fig. 10 shows a typical worn condition. Instead of discarding the entire spinner unit, spindle shank and all, the worn discs are often burned away and re-



Fig. 11—Trailer "eye" connectors made from scrap

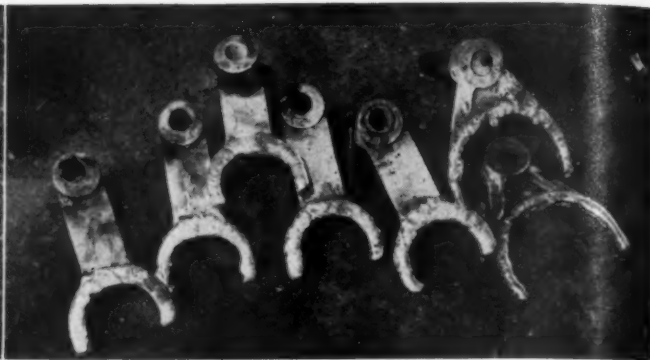


Fig. 12—Worn shifting collars are brazed and ground

placed with 7/16-in. metal discs cut from scrap or stock steel plate. A supply of plates, cut to circular shape, is kept on hand. At other times the old plate is left in place and the worn circular path filled by tacking in a ring-shaped piece of steel.

Fig. 11 shows two home-made trailer eyes, made from cold rolled steel. Fig. 12 shows how the shifting forks on various units are bronze-welded (acetylene) ready for grinding to original dimensions.

To maintain its 1,780 miles of state and 2,730 miles of state-aid roads, and

provide rental units for construction and maintenance service on town roads, Vermont today has 47 trucks, 25 power graders, 74 rubber-tired pull graders, 13 rollers, 14 machinery trailers, 16 power shovels up to ¾-yd., 4 large tractors, 14 portable aggregate plants, 8 rock drilling outfits, 10 concrete mixers, several bituminous mixers, 21 pumps, 100 sand spreaders, 48 salt spreaders and over 100 snow plow units. Vermont thrift and ingenuity will keep this equipment ready for any emergency long after the "books" say it should be worn out.

formerly used. Signs stay protected about two years longer, as a rule. The county's signs are systematically inspected, and hauled in for repainting at the first evidence of deterioration. In renovating an old, rusty sign, it is first run through a stripper bath

## Longer Sign Service With Infra-Red Enameling Oven

ONE of the most valuable conservation measures in use by the Wayne County (Mich.) Road Commission is its infra-red enameling oven for road and street signs. The

accompanying photo shows this device. According to durability tests, this oven finish with a high-grade baking enamel lasts much longer than air-dried synthetic and oil enamels



Spraying enamel preparatory to baking



Two banks of infra-red lights provide the heat for re-enameling Wayne County's road signs. The bulbs were supplied by a local auto manufacturer



Detroit's recent mushroom growth has required many new traffic signs. Scene in the county's sign shop

of alkali solution to remove all paint, rust and scale.

The county also is manufacturing hundreds of new signs this year, using ordinary painted wood or composition construction as an emergency measure.

**PUMPS**—"Handbook for Wartime Care of Centrifugal Pumps," a new Allis-Chalmers booklet, tells you specifically how to get an emergency war basis with your pump maintenance. Valuable war-time tips include: how a change in liquid can stop a pump; easy ways to find leaks; common mistakes in packing a stuffing box; how tight is "too tight" for a packing gland; how to figure "head"; how to protect pump from cavitation; quick trouble shooting, etc. Applies to all makes. Available on request to Allis-Chalmers Mfg. Company, Milwaukee, Wis.



# N.Y. Highway Shops Hum on Salvage Jobs



New York highway department's big machine shop at Waterford, where special repair jobs are handled for all state highway districts

**I**N SPITE of the fact that snow removal is a county responsibility, the New York state highway department requires a tremendous fleet of equipment to keep up the maintenance of the state roads. One 8-county district alone, in the Albany area, finds that its 180 trucks and 180 other gasoline-powered units are none too many to do a minimum wartime job.

Each of the state's district garages does its own normal maintenance and repair work. In addition, special jobs are centered at certain shops. For instance, the Buffalo garage is where road signs are reconditioned, built or repainted. The Waterford and Syracuse shops have special facilities for reconditioning cylinders, or grinding and refitting engines with new cylinders, pistons, etc. And at Watertown is where all canvas work is sent, such as side curtain and seat cushion renovation, tarpaulins, covers, etc.

The Waterford garage is of particular interest today, however, because of its machine shop—one of the best equipped highway department shops in America. This shop got its beginning when machine tools were turned over to it after the World War. Through careful use, some of these units are still in service, along with newer units including some of the

most up-to-date automotive repair equipment (see list, page 70).

The New York highway department has been slower to feel the pinch on replacement parts than some other organizations, but it is getting increasingly on an emergency basis, as evidenced by several jobs recently observed on the shop floor.

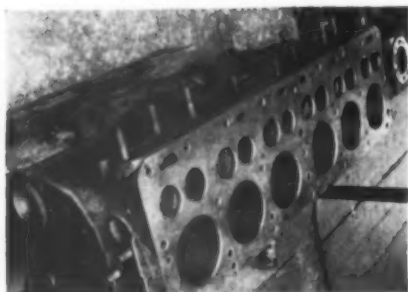
1. Grader and snow plow blades—a pile of worn blades was waiting to

be welded on the sides of used ones, to conserve metal (New York was one of the first to practice this economy).

2. A set of brackets from an F W D truck transmission were being built up with bronze welding rod. The photo shows three stages—one, worn bracket before starting work, another with the worn hole welded up, a third with the new bronze machined and ready for installing. Both the



FWD truck transmission brackets, shown in three stages of restoring the worn bearings



In other days, this motor block head would have been junked. Welded and re-machined, it is ready for more service

hangar and the housing parts of the bearings of these units had become so worn in service that the transmission (3-point-suspended) had started to vibrate badly. Restoration of the bearings, which were worn down  $\frac{1}{4}$  to  $\frac{1}{2}$  inch, involved acetylene welding, a simple lathe job on the bearings, and sometimes also lathe-turning the shaft to fit.

3. A Continental 6-cyl. motor block case, cracked so badly that in other years it probably would have been more economical to scrap it, was salvaged by sending to the Ralph Stark, Inc., shop on Long Island for acetylene welding while pre-heated. Three small local cracks between a cylinder and valve seat were welded. At the same time, the welder was used to build up worn valve seats, and the block head face was then planed to a new finish. (The welding of cast iron blocks, heads, etc., is the only repair work which is sent out of the Department shops. All other repairs are done by Department forces.)

Back at the Waterford shop the valve seats were re-ground, valves and pistons fitted, and another good-as-new engine went back out on road service this spring!

#### Watch Inside Dual Wheels

A seemingly small but important detail vigilantly handled at Waterford is the condition of the inside wheels of rear duals and the matching of tires. It is hard for the driver to detect quickly that a wheel has started to get loose, and a careless driver may let the condition progress until the whole torque is on one of the duals, resulting in added tire wear and rear-end stress and strain and retention stud breakage; also driving stud and wheel breakage.

Cure: Take off and inspect inner wheels frequently. If a wheel should be run loose without detection, as soon as it is discovered that the bolt holes start to wear, it is necessary to weld and grind the hole to the original tight, countersunk fit.

These items, of course, give only a

glimpse of the state's wartime activities. New York has traveling mechanics and service trucks, which look after lubrication, preventive maintenance inspection and field repair which are part of a long established inspection and preventive maintenance routine. Road and road equipment maintenance are under David Noonan, Assistant Commissioner of Highways, with J. W. Mulligan, Chief Motor Equipment Maintenance Superintendent. The Waterford shop is under J. W. Holler, district engineer, and E. S. Statts, Motor Equipment Maintenance Superintendent.

#### Machine Shop Equipment at Waterford, N. Y.

Horiz. Miller—Cincinnati—Cone type, 38" table.  
Engine Lathe—American—16"x78".  
Vert. Milling Machine—Becker—28"x10 $\frac{1}{4}$ ".  
Bench Grinder—Cincinnati.  
Power Hack-Saw—Peerless.  
Engine Lathe—Master—10" Swing, 36".  
Cylinder Grinding Machine—Heald.  
Cylinder Reboring Machine—Marvel.  
Heavy-Duty Shaper—American.  
Piston Turning and Grinding Machine with Cam Grinding Attachment—Van Norman No. 88.  
Cylinder Reboring Bar—Van Norman Per-fect-o.  
Universal Cutting and Tool Grinder—Grand Rapids.  
Screw Machine—Cincinnati.  
2-Spindle Drill Press—Sipp.  
Acetylene Outfit—Oxweld.  
Radial Drill—American—Triple Purpose.  
Brake Drum Lathe—Stiles Portable.  
Pedestal Grinder—Blount.  
Heavy-Duty Engine Lathe—Le Blond—21" Swing, 36" Centers.  
Valve Grinding Machine—Kwik-Way.  
Keyseater—Davis.  
Hand Punch Press—Kidder.  
Pin Hole Grinder—Sunnen.  
Brake Lining and Grinding Machine—Stiles Heavy-Duty.  
Valve Seat Grinder—Hall.  
Portable elec. welding machine—Hobart Woodworking Equip.  
Jointer—Crescent.  
Band Saw—Crescent.  
Power Saw—DeWalt.

#### Oxyacetylene Flame Adjustment Color Chart

Prepared particularly for guidance of new welders, AIRCO'S new chart for oxyacetylene flame adjustment is being welcomed even by "old hands." It shows natural color photographs of five fundamental flame adjustments: Acetylene burning in air; a strongly carburizing flame; slight ex-

cess of acetylene flame; neutral flame; an oxidizing flame.

Being completely graphic, it conveys the proper appearance of the various welding flames faster and more accurately than any amount of descriptive instruction. This chart is a vitally important guide for every welder, for even the best manipulative welding skill is wasted unless flame adjustments are correct.

Desired quantities of these charts (which contain no advertising) may be obtained on request to Air Reduction Co., 60 East 42nd St., New York N. Y.

#### Nose Protector for Valuable Pump Hose

From Martin M. Kennedy, superintendent of the municipal garage at Madison, Wisconsin, comes this kink for prolonging the life of a large and



valuable metal-reinforced rubber suction pump hose. The union recently broke off, taking a piece of hose with it. To avoid a repetition of the damage, Mr. Kennedy backed up the union with a new metal pipe sleeve, and also welded on a collar that clamps on the hose end as shown in the photograph. The hose is held securely between collar and clamp.

#### Handling Tire Casings

When handling recapped as well as new tires, pile stored casings flat, directly on top of one another, to avoid kinking the wire beads and distorting the tire.

#### Synthetic Rubber Paint

Tires that must remain stored outdoors should be coated with a synthetic rubber paint as a protective covering. A cover or wrapping of heavy canvas, or a similar material, may be used for the same purpose.



## Welding a Scraper Drawbar

THE accompanying photographs showing splicing of a heavy scraper tongue were taken in the shop of Geo. M. Brewster and Son, Inc., Bogota, New Jersey.

The upper view shows a typical field splice. Without attempting to true up the bar, the field repairmen here have simply welded short iron straps on all 4 sides as shown, sufficient to hold until the machine could be brought in to the home shop.

The lower view shows the bar after the straps have been burned away preparatory to straightening the tongue and welding it more carefully.

According to the Service Dept. of R. G. LeTourneau, Inc., the usual recommended practice for fixing a drawbar break is as follows:

1. Clean cut and cut a "V" along the edges of break.
2. Weld the break.
3. Place eight 1½-in. sq. steel straps 15 inches in length across the weld, two on each side. Weld these on the sides, but not across the ends.

Quite often the repairmen will weld side plates on all four sides instead of straps. In some cases this has worked very well, while in others there is a tendency for a new break to develop in front or back of the plate sleeves.

*(Experiences on this and similar repair problems and successful methods of fixing will be welcome from our readers—Editor.)*



Field splice of Le Tourneau drawbar.



Preparing to re-weld in the shop—note vertical break just back of the grinder.

### How to Prolong Jaw Crusher Service by Correct Lubrication

With the object of prolonging to the utmost the useful life of the crushers now in service, an exhaustive maintenance survey has been conducted by the engineers of the Universal Engineering Corporation (formerly the Universal Crusher Company) of Cedar Rapids, Iowa. This survey, prompted by the curtailment of manufacture of new crushers, involved detailed inspection of many crusher installations and interviews with the operators.

The results of the survey emphasize the need of proper lubrication for crushers, and the fact that by no means all of them are getting it. Too many operators of crushing plants have assumed that an occasional injection of lubricant was all that was necessary. The man responsible for doing this is frequently negligent—

no doubt unintentionally. As a matter of fact, the company's engineers declare crushers require a definite lubrication program if production delays and unnecessary maintenance costs are to be avoided. Lack of proper lubrication can cause costly failures of bearings made of vital, much needed metals.

With the cooperation of a number of crusher operators and several oil companies, the following rules for the lubrication of crushers have been formulated, which should prove helpful to all operators.

1. Inspect the bearings often; at least four times daily with bronze bearing crushers and at regular intervals with roller bearing crushers. Check them for overheating.
2. Wipe lubricating vents with clean rags before putting them in new grease. Wipe off plugs (1). They can be flushed with a thin oil

such as SAE 10. Don't use kerosene on bearings.

3. Use only clean containers to store oil. Don't keep containers near crushing operations, as float dust is penetrating and contaminates lubricants.
4. Place a burlap bag or waste-saturated with crank case drainings on top of the toggle plate at lower end. It will serve two purposes: keep out dirt and grit, and lubricate the bearing.
5. Keep the sliding surfaces of the adjustment wedges and the screws clean. Oil regularly to prevent rust.
6. If adjustment screws are exposed, it is a good idea to tie a piece of cloth around them to keep out grit; a small matter that only takes a few minutes, but pays dividends.
7. Don't over-oil or grease. Bearings have to "breathe" and too



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It will pay you to insist on W.G.B. Clarifiers for gas and Diesel engines. You will find them sturdy, simple, efficient, and inexpensive to service and refill.

A fine book, explaining the mechanics and theory of W.G.B. clarification, and picturing all models will be sent you free on request.



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much lubricant can smother them, causing over-heating.

8. Be sure to use thinner lubricants in below-freezing weather (2).
9. It is poor economy to keep adding oil and grease when it should be changed.
10. Clean nozzle of grease gun before using by pumping out a shot of grease. Also clean off the plug and lay it in a clean place so that no grit will adhere to the threads.
11. Check the lubrication chart that comes with your crusher and follow the dictates regularly (3). The manufacturer knows what's needed to keep the equipment running.

### Keep the Mixer Clean

One of the simplest instructions to be followed in connection with the operation of a concrete mixer, yet one of the most important, is that of keeping the *entire machine clean*, according to the Ransome Machinery Co.'s maintenance manual.

It must be remembered that concrete is a plastic material and is inclined to build up where small portions have been allowed to accumulate and, in some cases, this might interfere with the operation of the machine to a great extent.

Usually it is also found that, in the case where a machine is kept clean, it is also properly lubricated, so that concrete is not allowed to accumulate to a point where it may obstruct the lubrication fittings.

A clean concrete mixer is also a very good indication of the general care it is receiving.

Many contractors coat the entire operating portions of the mixer itself and especially the drum, with Form Oil. This makes it possible to clean off the machine after a day's operation with comparative ease, as the concrete does not have a tendency to

adhere to Form Oil the way it ordinarily would to the bare steel or paint.

### Cleaning the Mixer

The most common practice of keeping the outside of the machine clean is to wash it down well with a hose at night before shutting down and knocking off all small portions of concrete which have adhered to the drum blades or adjacent parts. Do not pound skip bottom or drum shell to remove aggregates or hardened concrete. This will cause concrete to more readily adhere to the dents and bumps thus created.

The inside of the drum is usually kept clean by putting through about a half batch of stone or gravel when shutting down at noon time and another at night, allowing it to revolve in the drum for some four or five minutes so that it has a tendency to knock off any accumulations of concrete on the blades.

There is, however, one very important point in connection with keeping the inside of the drum clean which should be given very serious attention. This refers specifically to the manner in which the water is applied. Water for cleaning a mixer (at least the Ransome machine) should enter the drum at approximately 45 degrees

(Continued on page 75)

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ROADS AND STREETS, May, 1943



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## Keep the Mixer Clean

(Continued from page 72)

from vertical, toward the lefthand side when facing the power loading skip or charging side of the drum.

This causes the water to hit the back side of the feed blade as it is coming down and the water splashes over the top and then cleans the other side of the blade.

The entry of the water should be started when the power loader is about one-third off the ground, so that the actual entry of the water starts just a few seconds before the material is in the drum. This small intervening period gives the water a chance to do its cleaning operation before it becomes part of the mix.

## Where to Check When There Is Loss of Speed in Raising Moldboard

According to advice from The Baker Manufacturing Co., any of the following "niggers in the woodpile" might be to blame if the apron lift of your Baker bulldozer is off its feed:

1. Check the oil supply in the tank and make sure that it is three-quarters full of good clean oil, when the cutting edge is resting on the ground.

2. The next place to look is in the suction hose between the pump and the supply tank. It sometimes happens that the lining of the hose collapses and causes the hose to be choked. In this case only the hose would have to be replaced.

3. Worn out cup leathers in cylinders will cause moldboard to raise slowly, due to oil passing between piston and cylinder wall.

4. When the operation starts to slow up do not re-set the relief valve expecting to cure the trouble. This relief valve is set for the proper operation when the bulldozer is new and if, at that time, the operation was satisfactory, raising the pressure by re-setting will not cure the trouble.

5. If the above suggestions of possible trouble do not increase the speed of raising the moldboard, then pump should be removed from the tractor and taken apart.

6. Ordinarily, outside of keeping the bolts tight and using clean oil, there is nothing to do on the pump. However, a close watch should be kept on the amount of oil used. If no

leaks are in the pipe line or hose and the oil is disappearing, it is possible that the rotary seal has given way and the oil is being wasted by going into the transmission case in which case the seal should be immediately replaced.

## Rock Drill Repair and Maintenance Costs

Printed sheets to aid in recording repair and maintenance costs of rock drills have been prepared by Inger-

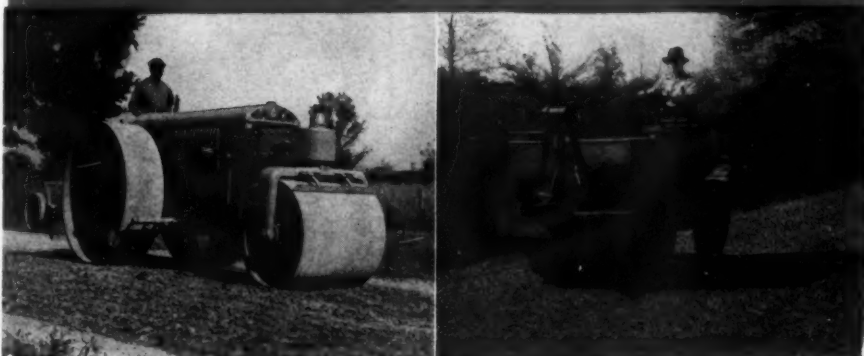
soll-Rand Co., 11 Broadway, New York City, and will be sent free of charge to all users of rock drills.

These sheets make it possible to show accurately the upkeep cost of every drill in service; also such pertinent data as the drill number, class, model, manufacturer, names and numbers of new parts installed, cost of installing parts, number of shifts the drill works, etc.

The size of the sheets are 8½ in. x 11 in. They are designed to fit in any standard file and are punched for use in standard 3-ring binders.

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MOTOR GRADERS



ROAD ROLLERS — MOTOR GRADERS — SPREADERS

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# GALION

ROAD ROLLERS

## New Equipment and Materials

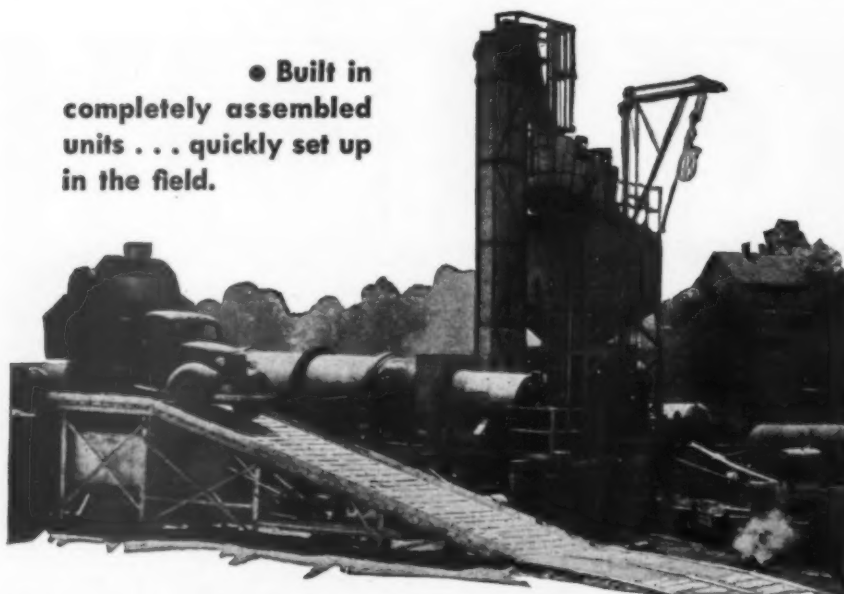
A portable tool development to conserve aluminum, is announced by Independent Pneumatic Tool Company, Chicago. Recently it "unveiled" to a group of engineers its new Thor  $\frac{1}{4}$ -in. capacity Plastic Electric Drill.

The new Thor drill, its housings constructed of tough "Thorite" plastic, had been under exclusive produc-

tion for the Army for nearly a year. It is now being released immediately for use by war industries.

According to W. G. Mitchell, chief Thor engineer, the drill conserves aluminum and at the same time answering production demands with a heavy-duty electric drill that will not only maintain required wartime paces

• Built in completely assembled units . . . quickly set up in the field.



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By "portable" we mean that this Model PA asphalt mixing plant is not only easily disassembled and moved from one job to another by truck or rail, but it can be quickly set up because units are entirely self-contained and require no field assembly. This means a big saving in assembly time—hours instead of days. The portable features of this plant are obtained without sacrificing either plant capacity, operating efficiency or durability. . . . Hetherington & Berner, America's oldest builder of asphalt mixing plants, offers the newest developments in both stationary and portable plant design. Write for Bulletin RS-260.

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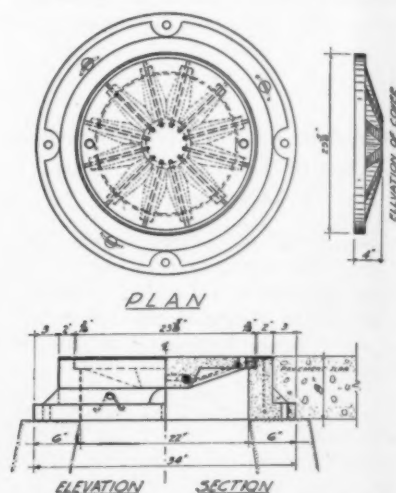
*Hetherington & Berner*

Among its features: 14% lighter but out-do many old-type drills, weight, easier handling because of its lightness, cooler running, and great protection from shock because of the durability of the new plastic.

### Concrete Manhole Covers

A manhole cover and frame of precast concrete have been developed by the Cast Stone Institute. New in basic design and structural properties, these products are designed to carry the heaviest legal highway wheel load concentrations, plus 25% impact.

In form the cover consists of a king-post truss giving high strength with small quantities of concrete and rein-



Construction details on concrete manhole frame and cover.

forcing steel. Structural details as shown cover a range of diameters up to 27 in. For sizes over 27 in. it is said that the use of a concrete frame, in combination with a cast iron cover will save 70% of cast iron otherwise required.

Descriptive bulletin "Precast Concrete Manhole Fittings," along with name of distributors of this product, is obtainable from the Cast Stone Institute, 2135 Queens Chapel Road, N. E., Washington, D. C.

### New Smooth Surface Street Lighting Globe

For street and highway lighting, a new smooth surface globe which reduces maintenance is announced by Westinghouse Electric and Manufacturing Company. Perfectly smooth on the outside, the new globe is finished on the inside with a uniform pattern of rectilinear configurations, through which light rays are diffused horizontally. The smooth outside surface retards the collection of normal dust and dirt, because there are no grooves to accumulate smoke and grease film. Scrub-brush cleaning is no longer nec-

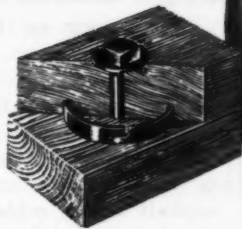


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ROADS AND STREETS, May, 1943

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FINISH PAPER  
"SCOTCHLITE"

essary, and time required for cleaning and drying has been cut in half. The new globe is of pressed construction, resulting in a more uniform pattern and more uniform light distribution. The pressing process produces a smooth, rounded, "chip-proof" fitter edge which gives added strength and structural support to the globe. It is available in two types, long and short. Additional information may be secured from the Westinghouse Lighting Division, Edgewater Park, Cleveland, Ohio.

### Ball Bearing Tail Rope Sheaves for Use with Sullivan Haulers

Sullivan Machinery Co., Michigan City, Ind., has developed a special ball bearing sheave for use with Sullivan scraper haulers. All side covers and sheave wheels are tough alloy steel. Hooks, eyebolts and clevises are forged from alloy steel. An extra wide sheave wheel



Tail Rope Sheaves

reduces rope wear. Openings are large enough to pass a square knot of rope. Quick opening snatch block construction gives fast, easy rope change. Greasing is required but once a year.

### Maine Converts Old Tar Distributors Into New

The government is asking everybody to help conserve vital war materials these days. Here's how Maine did it.

They bought a number of plain Littleford Bros. tanks earlier this year from Eastern Tractor & Equipment Company, and then utilized mostly old available parts to rebuild their old, worn-out truck-mounted distributor tanks. The photograph on page 80 shows two of the finished outfits. A. W. Blaisdell, manager, Motor Transport Division, of the Maine Highway Department, reports:

"In making up this equipment we purchased new engines but the pump, piping, fittings, spray bars, etc., were taken off our old distributors. The spray bars in the photograph are 8 ft. but we have an extension to give us 12 ft. These distributors have been used on heavy road tar almost exclusively. We haven't used them for asphalt or any road oils and possibly we couldn't use them for asphalt during colder weather. However, during the hot weather, there shouldn't be any difficulty in using them for asphalt."

While the above spray outfits have their limitations for spraying bituminous materials they help preserve the strategic roads of Maine and show what can be done in an emergency.



*Your*

**HAZARD**  
**LAY-SET**

*Preformed*

**WILL LAST  
LONGER ON  
PROPER SHEAVES**

Although it is widely acknowledged that **HAZARD LAY-SET PRE-FORMED WIRE ROPE** is easier on sheaves than non-preformed rope, even **LAY-SET** will last still longer and give better service if it operates over the proper size sheave of the correct material.

A sheave that is too small imposes a severe fatiguing effect on the rope, which produces premature fracturing of its wires.

Sheave treads, sheave bearings, and fleet angles should all be watched to protect both rope and sheave life. Wherever possible, sheave diameters should not be less than the values given below:—

|                                   |                              |
|-----------------------------------|------------------------------|
| for 6x 7 construction.....        | 42 times diam. of rope       |
| for 6x19 Seale construction.....  | 34 times diam. of rope       |
| for 6x16 Filler Wire construction | }.....30 times diam. of rope |
| for 6x19 Warrington construction  |                              |
| for Flattened Strand              | }.....26 times diam. of rope |
| for 6x19 Filler Wire              |                              |
| for 8x19 Seale construction       | }.....23 times diam. of rope |
| for 6x22 Filler Wire.....         |                              |
| for 8x19 Warrington               | }.....21 times diam. of rope |
| for 8x19 Filler Wire              |                              |
| for 6x37 Seale                    | }.....18 times diam. of rope |
| for 6x41                          |                              |

Ask your nearest **HAZARD** man to help you get longer life and better service from your ropes and rope equipment. All **HAZARD** ropes made of Improved Plow Steel are identified by the Green Strand.

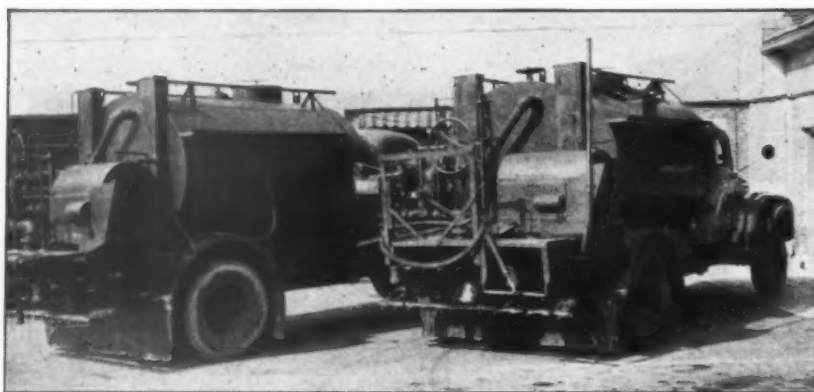
#### HAZARD WIRE ROPE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles,  
New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

**AMERICAN CHAIN & CABLE COMPANY, INC.**  
BRIDGEPORT, CONNECTICUT



**HAZARD LAY-SET** *Preformed* **WIRE ROPE**



Littleford Bros. tanks

**STAMP OUT DECAY!**

**APPLY OSMOPLASTIC to these Danger Spots**

**1** Where piling touches cap and sway-bracing.

**2** Between and atop planking joists. Also where laminated deck seats contact cap (when treated planking not available).

**3** At the ground-line or waterline of piling.

**4** Where rail posts touch handrails, hub guards, deck and cap.

Highway engineers who "know their stuff" know that decay of bridge timbers means heavy repair costs... plus valuable man-hours lost! And with treated timber mighty scarce today, effective "spot" treatment is the only way to prevent rot.

Apply OSMOPLASTIC to the vulnerable sections where decay usually starts. Wherever timber touches timber... or humid earth... or stands in water... OSMOPLASTIC adds extra years of service.

The cost of applying this superior wood-preserved with ordinary labor is amazingly low. OSMOPLASTIC protects all your timber installations, whether bridges... culverts... highway guard-rails... guide or fence-posts.

Save your timbers today from decay tomorrow... with OSMOPLASTIC!

(P. S.: Osmoplastic has a surface coverage of approximately 75 sq. ft. per gallon!)

Osmose Wood Preserving Company of America, Inc. Dept. R  
1437 Bailey Avenue, Buffalo, N. Y.  
Please send me full information on Osmoplastic applications.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City and State \_\_\_\_\_

**OSMOSE**  
WOOD PRESERVING  
COMPANY OF AMERICA, Inc.  
BUFFALO, N. Y.

DENVER CHICAGO NEW YORK  
KENOVA, W. VA. BIRMINGHAM  
SEATTLE SAN FRANCISCO

### Plastic Safety Marker

A safety marker made of non-essential white plastic has been placed on the market by Far-Lin, Inc., Burlington, N. J. The marker is made under heavy hydraulic pressure,



Installation of Far-Lin Markers

under a patented process. It is stated that these markers will remain white under all conditions and that they will withstand a heavy pounding of traffic without crushing or deterioration; and will maintain a skidproof abrasive surface under wear.

### Hyster Unit Designed for Double Duty

The Model HN Power Control Unit, combines a LeTourneau single-drum PCU for Dozer operation with a Hyster D4 Towing Winch. This development makes possible the combination installation of a bulldozer and towing winch on the same "Cater-



New LeTourneau Hyster Unit

pillar" D4 or R4 tractor. Both Hyster winch and Power Control Unit are standard, job-proved models combined here into one compact unit. Towing winch and PCU can be operated independently or together. The LeTourneau drum has a speed of 308 feet per minute on bare drum; the Hyster Winch has a line pull of 15,400 pounds and its line speed is 91 feet per minute on the bare drum.



### 3-Billion-a-Year Road Programs to Help Win the Peace

(Continued from page 59)

forces, would be looking for jobs. Provisions now for a full-sized postwar highway program would be the part that the highway industry and profession would play in winning the peace.

While the governmental policy would be to allow private enterprise to provide postwar employment, failure to do this even in part would result in another WPA or similar work relief program. This places the situation squarely in the hands of the highway industry and profession, not only from the economic standpoint, but also in giving the assurance to war workers and military forces now that there will be no lack of worthwhile employment after the war.

#### Biggest-Ever Task Ahead

The great danger now lies in the lack of realization of the size of the job to be done. Many of the highway building agencies have heretofore thought of highway programs in terms of a few millions of dollars. The post-war program must be in *billions*, if it is to fulfill its purpose. It must be of sufficient size to last over a period of years. A five or six year program, regulated in size from year to year by economic demands, would result in the modernization of our present highway system and would eliminate the possibility of any industrial collapse.

Every state, county, city and regional area should have a planned program of highway construction. Reserve funds should be accumulated to finance postwar projects or to participate with the federal government on a matching or loan-and-grant basis. Wasteful spending on improvised work programs will be the result of neglecting to provide plans, specifications and cost estimates for construction projects to be carried on after the war.

#### Conclusions from the Past

While it is very certain that we are experiencing an economic upheaval which has no precedent, it is also certain that future mistakes can be minimized by an analysis of economic trends of the past. The utilization of this information has led to certain conclusions concerning the situation confronting us in the post-war years. In general, they may be listed as follows:

- 1—There must be no unemployment.
- 2—Construction volume must be maintained at a high level.
- 3—There must be a long-range highway construction program.
- 4—There must be no improvised relief work.

5—There must be a shelf of highway projects of sufficient size to insure an annual \$3,000,000,000 program for at least five years.

The present lapse in highway construction offers an excellent opportunity to plan a program that will result in a modern network of highways. *Coordinated action by states, counties and cities has long been desired and if, at the end of the war, a plan which will remove our traffic bottlenecks is in readiness, funds which might otherwise be wastefully spent on relief work will be spent on the much-needed*

*improvement of our highway system.*

There is the possibility that private construction will be slow starting, although normally it should constitute the greater percentage of the post-war construction volume. For this reason, the highway construction program should be ready to fill in this possible lag or any subsequent letdown in private construction which might occur. The preparation of this program is urgent.

#### Size of Program

The construction program totalled

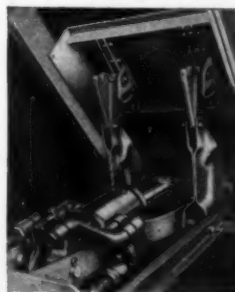
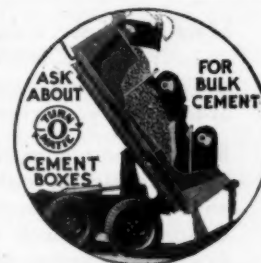
## A HERCULES HYDRAULIC BOOSTER HOIST

**MAKES ANY  
TRUCK A...  
DUMP TRUCK**



Install HERCULES DOUBLE-ARM HYDRAULIC HOISTS under your platform, stake, express or special bodies, which are now idle. Unload the easy way!

With wartime restrictions preventing your purchase of all the new equipment you need, it's more important than ever that present equipment be used at maximum efficiency.



Model KXE Hercules Booster Hoist, with 6" cylinder, for bodies up to 12 feet long. Rated capacity of 4 tons with a 9 foot body. Control valve is operated from the driver's seat, and the low oil pressure required assures long life of unit.

Reinforcing plate relieves lifting strains. Assembly includes 12 foot steel sills for reinforcement of wood body sills.

**HERCULES STEEL PRODUCTS CO.**  
GALION, OHIO

ROADS AND STREETS, May, 1943

\$14,000,000,000 in 1942. The program will be reduced to minimum for the duration of the war. This reduction will result in a huge demand for facilities after the war, the volume depending on the duration. Estimates have been made on the demand for private construction of all kinds, and figures have been submitted on justifiable expenditures during the post-war years. The private program has been estimated at \$10,000,000,000 a year, for a period of years. Supplementing this, public expenditures of \$5,000,000,000 could be spent on useful projects, to include \$3,000,000,000 on highways and \$2,000,000,000 on

other public works, including airports. The \$3,000,000,000 for roads would possibly be spent: \$500,000,000 for grade, \$700,000,000 to the states; \$200,000,000 to counties, \$400,000,000 to cities, \$1,200,000,000 to 100 metropolitan areas.

#### Nature of the Post-war Highway Program

State-wide, fact-finding surveys have been made as a part of the preparation of a master plan for a national system of highways. The magnitude of the job ahead is indicated in a statement under Highway Planning in the recent report, "Transportation and the National Policy," by the National Resources Planning Board.

An example of the type of findings upon which future highway programs are being based is provided by the Maryland report, which found that failure of the 4,000-mile state primary system of highways to keep pace with the motor vehicle was evident in the following items:

6,000 dangerous sharp curves; 1,500 steep delaying grades; 6,000 hazardous short-sight-distance locations; 400 inadequate bridges; excessive mileage low-type surfacing, requiring heavy maintenance; many miles deteriorated surfaces; inadequate trans-city connections; inadequate rights-of-way; narrow pavements (77% of state mileage less than 20 ft. wide).

The National Resources Planning Board states that "Conditions similar to these are found in every state where factual reports are available." Funds must be spent according to a coordinated plan which will result in meeting the demands of traffic in all areas, and including construction and reconstruction of primary, secondary and local roads.

In urban areas, the program would include the construction of belt-line, limited-access highways; arterial highways into and through them; overpasses, underpasses and multi-lane roadways in connection; adequate parking facilities.

Much of the secondary highway system was designed for small-volume and low-speed traffic which has caused excessive maintenance costs. The program would require the raising of low-type surfacing to higher types, also much relocating and widening.

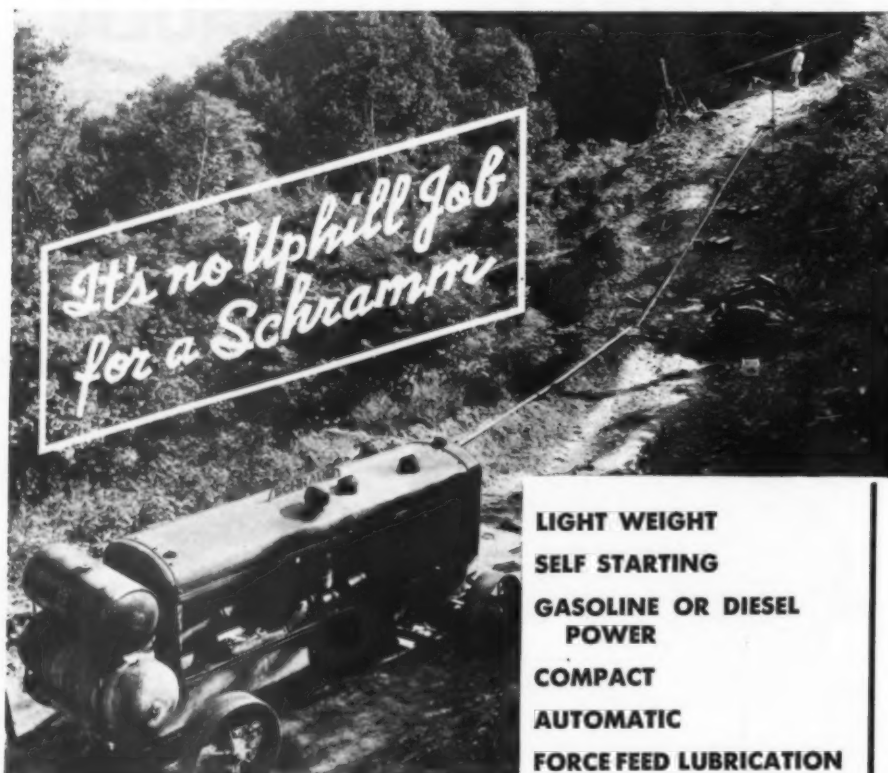
The construction of airports and "flight strips," or auxiliary landing areas for aircraft is sure to be an important part of the construction program. The present airport program, which has been set up principally for military needs, will necessarily be curtailed as these requirements are fulfilled. The huge expansion of air transport which will follow the war will necessitate not only a large program of new construction, but will require the reconstruction and enlargement of many of the present airports. The present program of flight strips or auxiliary landing areas will be greatly expanded.

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#### Interregional Highway System

An interregional highway system is proposed which includes every major line of interregional travel in the country, mileage approximates 27,000. Much of the system was built prior



*It's no Uphill Job  
for a Schramm*

**LIGHT WEIGHT  
SELF STARTING  
GASOLINE OR DIESEL  
POWER  
COMPACT  
AUTOMATIC  
FORCE FEED LUBRICATION**

Make it 24 hours a day—in Death Valley or a sub-zero spot in Canada. . . . If it's a SCHRAMM Compressor you can bank on uninterrupted delivery of rated capacity right around the clock in weather that may even knock your crews out.

Because these compressors are 100% water-cooled their performance is unaffected by outside temperatures—no sticking, no overheating, and correct lubrication at all times. SCHRAMM'S straight-lined design saves much critical material and without sacrificing either power or stamina, they weigh as much as 40% less than others of equal capacity.

**GASOLINE — DIESEL — ELECTRIC**

**SCHRAMM, INC.**

**THE COMPRESSOR PEOPLE**

**WEST CHESTER, PENNA.**



to the coming of the high-speed automobile and mass volume of traffic. Modernization is necessary throughout its length and particularly in the vicinity of large cities, everyone of which it touches.

This system includes the location of an express highway system, to be constructed as justified, the cost of which, when completed, would total \$2,500,000,000 for a network approximating 14,000 miles. An estimate, including certain portions of this, plus modernization of the 27,000-mile system, would total \$5,000,000,000.

### WPB Restrictions on Portable Conveyors

Production and delivery of portable conveyors used to move bulk materials are strictly controlled under the provisions of General Limitation Order L-287, issued recently by the War Production Board. The order restricts acceptance or delivery of portable conveyors or parts to those covered by approved purchase orders.

An "approved order" is a purchase order bearing a preference rating of AA-5 or higher if placed with or accepted by a manufacturer or dealer on or after May 10, 1943, or an A-1-c or higher rating if before that date. Purchase orders for the armed forces or other government agencies specifically named in L-287 automatically become approved orders.

The new order also provides that on and after June 9, 1943, no person shall manufacture, deliver or accept the delivery of any portable conveyor or parts, unless manufactured in accordance with specifications and restrictions on the use of materials as prescribed in Schedule A attached to L-287. This restriction, however, does not apply to conveyors or parts manufactured before May 10, 1943, to a point where other use of the particular item is impracticable. Neither does it apply to any purchase order accepted by the manufacturer prior to May 10, 1943, and delivered before June 9, 1943.

Restrictions on orders for repair and maintenance parts do not apply to any order of such parts for the necessary maintenance or repair of any portable conveyor in an amount not exceeding \$300 for any single portable conveyor.

## With the Manufacturers

Henry F. Schippel, of The B. F. Goodrich Company, Akron, Ohio, has returned to the United States after nearly a year in Africa where he was project engineer in charge of rubber products at two large American repair and maintenance bases.

Schippel, one of America's best known tire engineers, has been assigned to special engineering duties

with the company's aeronautical division, it is announced by James S. Pedler, in charge of B. F. Goodrich aeronautic activities.

### Bantam Bearings Corporation Becomes Division of the Torrington Company

Bantam Bearings Corp., South



## OSGOOD AIR CONTROL



the smooth, velvety, effortless control force with the operating ease and efficiency of steam. OSGOOD Air Control is simple in operation, easy to maintain, and costs next to nothing. Even though our production schedule is full—now is a good time to check on OSGOOD Air Control.

The  
**GENERAL**  
EXCAVATOR CO.  
Sizes: 1-1/2 to 12 Tons  
Diesel - Gas - Electric  
Associated with  
THE OSGOOD CO.

The  
**HERCULES**  
COMPANY  
HERCULES  
"IRON ROLLERS"  
6 to 12 Tons  
Diesel or Gasoline  
Associated with  
THE OSGOOD CO.

**OSGOOD**  
Sizes: 1/2 to 2 1/2 Cu. Yd.  
Diesel - OR - Gas - Electric  
SHOVELS  
DRAGLINES - CRANES  
Crawler & Wheel Mounted  
THE OSGOOD COMPANY, Marion, Ohio

Bend, Ind., a subsidiary of The Torrington Company of Torrington, Connecticut, for the past eight years, has been merged with its parent company and will henceforth be known as The Torrington Company, Bantam Bearings Division. The Bantam Division will retain its present personnel and continue its operations from the South Bend headquarters.

### New Athey Promotion

Athey Truss Wheel Co., Chicago, Ill., has announced the promotion of Claude E. Matthews to the position of Supervisor of Service and Parts. Mr. Matthews has been with the company since 1937 when he started as a factory serviceman and has had a broad contact with Athey "Caterpillar" Distributors. Mr. Matthews is a native of Colorado and attended the University of Colorado as a student in mechanical engineering. For six years he



C. E. Matthews

was associated with the Consumer's Company of Chicago where he gained a wide knowledge in Maintenance Engineering work. He then served for a year with U. S. Engineers as an inspector in dredging work in the Great Lakes. His experience with earth moving equipment from a standpoint of both maintenance and repairs, is being put to good use in the production of Technical Manuals for the various military services who are using Athey products.

### Knox New President of Bucyrus-Erie

In a series of changes designed to give increasing responsibility to

younger men, N. R. Knox was elected president of Bucyrus-Erie Co., South Milwaukee, Wis., at a meeting of the Board of Directors held in South Milwaukee on April 5. W. W. Coleman, company president for 32 years, was re-elected Chair-



N. R. Knox

man of the Board. George A. Morison, former vice president, was elected Vice Chairman of the Board. W. L. Little was elected Vice President, and will be in charge of the company's plants at Erie, Pa., and Evansville, Ind. N. A. McGrath was re-elected Secretary and J. G. Miller, Treasurer. Appointed officers now include W. M. Bager, Technical Director; D. P. Eells, Vice President with special assignments; P. H. Birkhead, Vice President in charge of the Sales Department; R. W. Newberry, Vice President in charge of the Commercial Department; C. K. Charlton, Assistant to the President. The senior officers will continue to devote full time to the company's affairs, but the changes will give increasing responsibility to younger members of the organization. Mr. Knox has been with the Bucyrus-Erie Company for 23 years. Upon leaving Harvard in 1920, he started work in the company's foundry as a special apprentice. His experience includes service as Electric Furnace Melter, Assistant to the Foundry Superintendent, Foundry Superintendent, General Superintendent, Works Manager and Assistant to the Vice President. He became Vice President in Charge of

# WILLIAMS Buckets

BUILT TO  
LAST AND  
MOVE DIRT  
FAST

## WELDED ROLLED STEEL CONSTRUCTION

eliminates cumbersome dead weight and insures a stronger bucket that will wear longer with less breakage and less cost for maintenance.

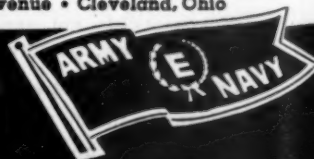
This welded design which has made Williams Buckets so universally used in steel mill service is now featured in all Williams Clamshell and Dragline Buckets.  $\frac{3}{8}$  to 16  $\frac{1}{2}$  yd. capacities.

Send for free bulletin covering types of buckets for your particular requirements. It shows details of design and many exclusive features that clearly prove why YOUR NEXT BUCKET SHOULD BE A WILLIAMS.

THE WELLMAN  
ENGINEERING COMPANY  
7003 Central Avenue • Cleveland, Ohio



Built by **WELLMAN**





Manufacturing in 1933 and held that office until his recent election to the presidency.

### New Minnesota Distributor for Kotal

The Inland Asphalt Corporation of 6500 N. Hamlin Ave., Chicago, Ill., mid-continent agents for Kotal, has announced the addition of The Lake Asphalt & Petroleum Co., 2639 University Ave., St. Paul, Minn., to their list of distributors. The Lake Asphalt & Petroleum Co., of which Charles M. Straight is president, will operate in the states of Minnesota and Iowa.

### Climax Engineering Interests Buy McAlear Manufacturing Co.

Ownership of McAlear Manufacturing Co., Chicago, producer of valves, regulating and control equipment, has been acquired by the interests controlling Climax Engineering Co., Clinton, Iowa, manufacturer of internal combustion engines, power units and generating sets. Edward F. Deacon, Climax president, also will be president and general manager of the McAlear Company.

### Madaloni Appointed Kotal Representative in Bermuda

The Kotal Company of New York City, announced recently that Mr. Peter Madaloni of 11 Broadway, New York City, will handle the sale of Kotal in Bermuda. World War II has brought many changes to the island of lilies and coral sand, and paving of the roads is the latest and by far the most revolutionary, second only to the introduction of the automobile, for it is to meet the demands of military motor transportation that the program for road improvement has been undertaken. Kotal has successfully met tests of the Department of Public Works in Bermuda of which Mr. Cyril H. Smith is director.

### American Steel & Wire Official Now Lt. Colonel

Harold C. Miller, who has been an executive with American Steel & Wire Corp., Cleveland, and now executive officer, Chicago Signal Depot, has been promoted to Lieutenant Colonel. He has won rapid promotion since being ordered from reserves to active duty in 1940. Col. Miller is an engineering graduate of Ohio State University.

### New Hoist

A new hoist has been brought out by The Lessmann Manufacturing Co., Des Moines, Ia.

These units can be furnished in almost any size and the reason for these special units is that they have a good pulling capacity as well as lifting capacity. They are being manufactured with both the solid uprights and carrier, the heavy duty type ranging from one to five tons as well as the streamlined treated bolt uprights and forks with the forks tapering from 2 inches to ¼ inch, high carbon steel.

The reason for the development, mainly, of these units was that it does work over soft ground for both pulling and carrying. The uprights are tilted back by mechanical control as well as forward in unloading position. They are powered with units from 25 to 48 horsepower.

The construction of these units is all special and is not an ordinary farm tractor due to the fact that both rear and front axles are spical and they are mounted on hard rubber and high pressure tires. Special mounting for tires is large road builder type so as

# BITUVIA *Road Tar*



## Speeds Maintenance and Repair Work



Write for copy of this pocket-size BITUVIA manual.

☆ Road maintenance and repair take on new importance in war time. Main highways and principal feeder roads must be kept in condition for the safe, speedy movement of food, munitions and other essential supplies. BITUVIA offers distinct advantages for the maintenance and repair of all types of roads. It is quickly applied, penetrates deeply, binds the aggregate firmly. The resilient, skid-resistant BITUVIA surface contributes to safe driving and longer tire life. Standard grades to meet all Federal, State, County and Municipal specifications.

**PLASTUVIA CRACK FILLER:** A waterproof filler which binds firmly to brick and concrete, filling and sealing cracks and openings to prevent water damage. Will not flow in summer nor crack in winter.

## REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana  
2513 S. DAMEN AVENUE, CHICAGO, ILLINOIS 500 FIFTH AVENUE, NEW YORK, N. Y. ST. LOUIS PARK, MINNEAPOLIS, MINN.  
SEVENTEEN PLANTS TO SERVE YOU



## UNIT SHOVELS are Doing their Job!



There never was a time when high production capacity, trouble-free serviceability, and extremely versatile operating capability counted for so much as it does today! The demand is for speed . . . and still more speed! But even more important than speed is . . . **DEPENDABILITY!**

It is because **UNIT POWER SHOVELS** are so ideally adapted to the requirements of such an era as this . . . when every man and every piece of equipment is called on for double duty . . . that these Shovels are in such great demand. Where there is dirt or rock handling to be done . . . **FAST** . . . Unit Shovels are doing the job with the greatest efficiency, and operating economy.

Although Universal Unit factory production is primarily devoted to making the military "tools" that are so urgently needed for winning Victory . . . we are also delivering Power Shovel Equipment for essential war construction operations. But over and above this . . . there is a great, decentralized army of **UNIT Equipment**, made and sold "before Pearl Harbor", busily engaged in the kind of work they are best fitted to do. In these operations they are proving, as never before, the sound engineering principles and heavy-duty dependability of **UNIT construction**.

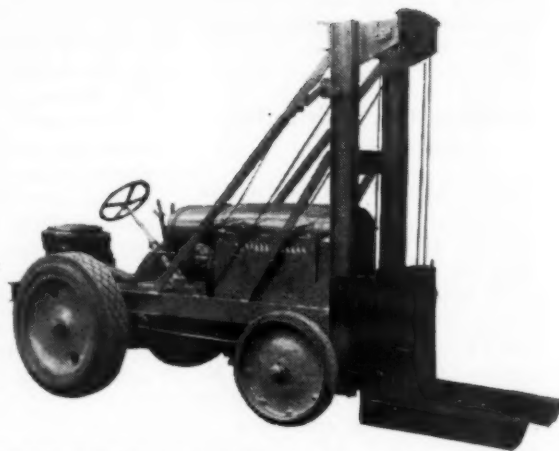
*UNIT Shovels are built to do their job, not merely "for the duration", but for many years to come.*



★  
Quality production of vital war equipment is an important consideration in today's industrial operations. Our ability in this respect is attested by the U. S. Army-Navy "E" award . . . the very first recognition of this kind accorded in the State of Wisconsin.

**UNIVERSAL UNIT  
POWER SHOVEL CORP.  
MILWAUKEE, WIS., U. S. A.**

ROADS AND STREETS, May, 1943



to give them good pulling where pulling is necessary. They are also equipped with special steering gears so as to make them easy to turn under any load condition.

## CORONACH

*"Of those immortal dead who live again*

*in minds made better by their presence."*

PAUL FRED HASSE, 56, former city engineer and employe of the Greater Peoria Sanitary district, died recently in Franklin, Ind., where he had been making his home. Mr. Hasse had been associated with the M. Pontarelli Construction Co. of Chicago, for the last two years, working on Camp Atterbury and an airport near Columbus, Ohio.

JERRY DONOHUE, consulting engineer of Sheboygan, Wis., and former chairman of the Wisconsin highway commission, died April 13 at the age of 58.

Donohue was commission chairman during the term of Governor Walter J. Kohler. He was appointed for a six-year term in 1929 but resigned in June of 1931. He was president of the Wisconsin Engineering Society in 1924, a director of the National Drainage Congress in 1926 and chairman of the committee on sanitation of the American Society of Municipal Improvements in 1928.

As president of the Jerry Donohue Engineering Co., Donohue achieved wide recognition as a consulting civil engineer, having designed municipal works, including water systems, sewerage systems, sewage disposal plants and street pavement projects for more than 20 cities and villages in Wisconsin and for communities in adjoining states. For the past year he had been chief engineer in charge of constructing streets, sewers, waterworks and a filtration plant at the Milwaukee Ordnance Works.

JOSEPH R. DORCESTER, noted designer of steel structures, died May 9 in Waltham, Mass. He was born in Waltham 82 years ago. He was graduated from Harvard University in 1882. He was for many years consulting engineer of the Boston Transit Commission.



## Ohio Bill Would Withhold Estimates from Bidders

The method of bidding on state highway construction in Ohio would be changed by a bill introduced into the State Senate, which would authorize the State Director to withhold engineers' estimates of highway construction costs until bids on projects have been received. The Senate has approved this bill, 21 to 11. Two previous assemblies defeated a similar proposal. Highway Department officials urged passage of the measure on the ground that publication of the departmental estimates discouraged genuinely competitive bidding.

## Redistribution of Equipment from Stopped Projects

Where construction projects are halted through the issuance by the War Production Board of revocation or stop orders, contractors will be advised in the future to contact redistribution officials of the appropriate regional office in regard to disposal of material purchased for projects which have been halted.

The Redistribution Division of WPB will assist contractors in disposing of material and equipment made available as the result of the issuance of revocation or stop orders.

A paragraph embodying this suggestion to contractors will be added to revocation orders issued in the future.

## New Regulations on Sale of Reusable Structural Shapes

Highway and city officials contemplating the use of salvage bridge iron to erect needed new structures will be interested in OPA Maximum Price Regulation No. 310 on this subject, effective May 8. Amending an order in force since Feb. 1, it classes salvaged assemblies such as trusses and built-up beams, columns and laterals as "reusable shapes," automatically assigning ceiling of 2.75 cents a pound. Complete bridges and other complete structures are not included. Copies may be obtained from the Office of Price Administration, local office or Washington.

## "Command Construction" Category Enlarged

The category of "command construction" as defined in Priorities Directive No. 2 has been enlarged by an amendment to include the remodeling of buildings, ordered by either the Chief of Staff, U. S. Army, or the Chief of Naval Operations, U. S. Navy, provided the total estimated cost of all materials to be incorporated into each structure is less than \$10,000, the War Production Board announced.

In addition to the type of project added by today's action, "command construction" includes the following types of construction to be built under contracts let by the Corps of Engineers or the Bureau of Yards and Docks: Airfields, military housing, alien housing, facilities for the repair or manufacture of finished items of munitions, having a value when completed of less than \$500,000; overseas or theatre-of-operations construction; seacoast fortifications, ports, and depots; camouflage and other passive defense projects (whether or not owned and operated by the Army and Navy), and emergency flood control projects having a value of less than \$100,000. The amendment takes effect immediately.

On America's Greatest Northern Air Base,

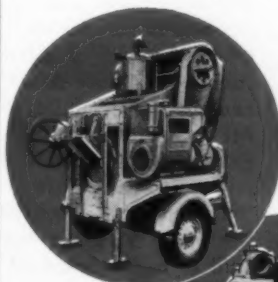
## TWO JAEGER PAVING TEAMS Lay 11,500 Linear Ft. of 10 Ft. Slab in 12-Hour Shift!



To build the latest stepping-stone to Europe, in a remote land without roads, McNamara Construction Co., Ltd., chose Jaeger Concrete Screw Spreaders and Jaeger Type "H" Finishers to team with two 34E pavers—worked 24 hours a day to complete 623,000 sq. yds. of 6" concrete runway in 10x100 ft. slabs—reached production rate as high as 13,000 sq. yds. (11,500 linear ft.) per 12-hour shift. Runways, which measure 200x6000 ft., already equal 53 miles of 20 ft. roadway—will constitute one of world's largest fields when extensions are completed.

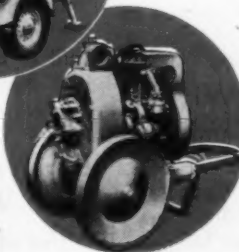
All equipment, including complete machine shop and gravel plant, workmen, materials and supplies (except local aggregate) had to be brought in by ship thru submarine-endangered waters open to navigation less than half of the year—a testimonial to the difficulties of the operation, the efficiency of its organization and the dependability of the equipment selected.

FOR HELP ON YOUR OWN PAVING, MIXING AND PUMPING PROBLEMS, CONSULT YOUR JAEGER DISTRIBUTOR: He offers proved machines and methods, knowledge of job layout and local conditions, complete repair parts and service to keep your equipment in top shape.



JAEGER SPEEDLINE TRAILER MIXERS

up to 145 size have machined steel drum tracks, automotive type transmission.

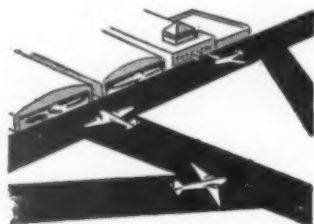


JAEGER "SURE-PRIME"—THE PUMPS THAT EXCEED THEIR PROMISES: Only pumps that, for years, have been individually tested and certified for vacuum, capacity and pressure and regularly exceed this guaranteed performance—with up to 5 times faster priming, high air and water capacity under adverse conditions and

thousands of extra hours of service. High pressure shell construction, replaceable liners, longest life seal, hi-head, hi-capacity impellers, oversize shafts—3000 to over 200,000 gallons capacity.

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223 Dublin Avenue, Columbus, Ohio  
Stocks and Service in Over 100 Cities

## ASPHALT for AIRPORT RUNWAYS



Adequate landing fields are urgently needed. Safe, all-weather Asphalt runways can be laid quickly. In most instances local material can be used, which further speeds up the work, and reduces the cost of Asphalt construction.

Airports built now for training and other war measures will also be an asset to your community after they are no longer needed for war.

Wherever Standard Oil Asphalt products are sold, there is an Asphalt Representative who can give you full information about these and other uses of Asphalt. Write . . .

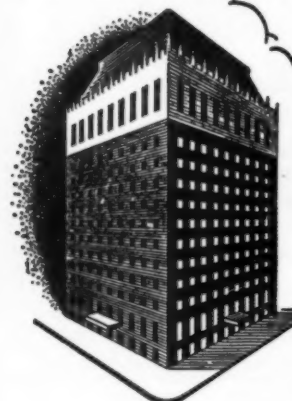
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910 SOUTH MICHIGAN AVENUE, CHICAGO

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of this outstanding hotel, noted as the civic, social and travel center of the city. There's far more to enjoy but it is far from being expensive.



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Official A.A.A. hotel. Home of the National Aeronautic Assn. Headquarters of civic clubs including: Rotary, Kiwanis, Blue Goose, Lions, Optimists, Ad-Sell, Omaha Executives.



## Personal Items about Engineers

JAMES N. WALLACE has been appointed district engineer for the West Virginia State Road Commission at Huntington. Mr. Wallace is secretary-treasurer of the West Virginia section, Society of Civil Engineers, a member of the executive committee and board of directors of the West Virginia Society of Professional Engineers and past president of the society's Huntington chapter.

### West Virginia Man Takes Washington Post With Traffic Advisory Committee

W. R. Dunman, manager of the West Virginia State Road Commission's War Transport Division, has been called to Washington to become associated with the National Highway Traffic Advisory Committee to the War Department, and to assume active direction of the committee's national staff when the present national director leaves on June 1.

The committee, which works in close

cooperation with the Public Roads Administration, the Office of Defense Transportation, and other agencies interested in solving wartime traffic and transportation problems, has been functioning since April, 1942, and has had the responsibility for the successful development of a six-point program, administered through sub-committees in each state.

Dunman, as executive secretary of the West Virginia sub-committee, is said to have organized the first state ride-sharing program, prior to gasoline rationing.

### Engineer Officer Wins War Department Award

One of 11 war department awards of the Legion of Merit to army personnel, made on March 17, went to Lt. Col. Carlin H. Whitesell, Jr., corps of engineers for army construction services in Alaska, according to the Seattle district office of the U. S. army engineers.

Lt. Col. Whitesell was first assigned to Alaska for construction duties on an air base in southeast Alaska under the Seattle engineer district. Subsequently, he has served under the Alaska defense command as resident engineer for army construction on two different islands in the Aleutians.

### Gauntlett on Washington Council

The Mountain Pacific chapter of the Associated General Contractors of America has appointed George Gauntlett, past chapter president and head of the Grays Harbor Construction Co. of Aberdeen, to represent the heavy construction industry on the state of Washington post-war planning council.

RICHARD N. SMITH has assumed duties as city manager of Ventura, Calif. He was formerly interior-term city manager of Phoenix, Ariz.

### "E" to Universal Engineering

Universal Engineering Corporation, Cedar Rapids, Ia., has been given the Army-Navy production award, to be presented to this firm's plant employees May 19.



## SAVE Manpower

The answer is the Root F-33 Curved Moldboard Hydraulic Scraper. Fast, Mobile, and easy to operate.



Grading—Shoulder Work—  
Snow and Ice.

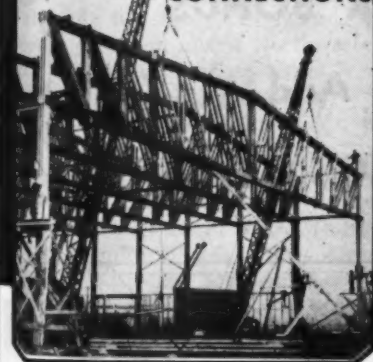
### ROOT SPRING SCRAPER CO.

Kalamazoo, Michigan

Builders of Truck Maintenance  
Equipment for more than 50 Yrs.

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FOR TIMBER  
CONNECTIONS



AAE TECHNICAL TRAINING COMMAND PHOTO

**HIGH TENSILE STEEL BOLTS**

**ADD STRENGTH  
INCREASED SAFETY FACTOR**

**SAVE CRITICAL TIME  
LABOR  
MATERIAL**

Bolts and Pins currently available  
of high tensile strength steel cut  
creation time and conserve critical  
field labor when used as wood con-  
nectors. Write for design bulletin.



**LACLEDE STEEL COMPANY**

SAINT LOUIS, MISSOURI

## Nation Faces Critical Road Conditions

(Continued from Page 50)

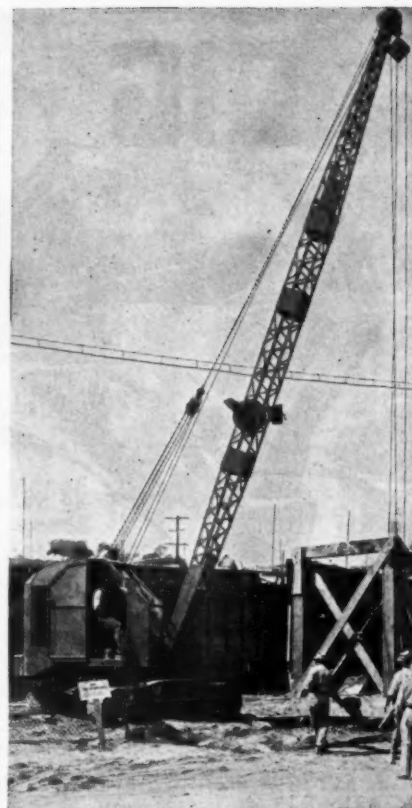
same period of 1941. However, heavy traffic in the upper weight brackets has gradually increased since 1941. This seems to be a serious condition because the damage inflicted to pavement by extremely heavy traffic is not always evident immediately.

A 50% drop in gas taxes is being met in the following manner: (a) An appreciable surplus had been accumulated on January 1, 1943. (b) Construction has been reduced to the minimum. (c) Improvements and betterments jobs and roadside development work have been practically eliminated from the program. (d) Maintenance is being carried on to practically the usual standard, but this is being done under more strict economy. Economy has been effected by savings on tires and tubes, gasoline and lubricating oils, a slight decrease in personnel, and salvaging old highway signs, parts and scrap.

We expect to have approximately 3,200 miles of bituminous and concrete roads approved for maintenance, and also to maintain the entire state highway system of 6,300 miles. We expect to get the following materials allocated for the 3,200 miles of approved roads: 1200 barrels of cement, 1200 tons of aggregate, 1,500,000 gallons of asphalt, 12,000 gallons of paints, and a reasonable amount of tires, tubes, parts, tools, etc.

Other stop-gap maintenance methods used, in addition to those named above, are: closer check on and better maintenance of all equipment, making of more parts from scrap material, and more efficient supervision of maintenance work. We have been forced to change specifications, not for efficiency but in order to continue certain works, on gasoline, asphalts, paints and highway signs.

We believe that we see our way clear whereby highway maintenance can be kept up to a high standard this year. The county supervisors (who maintain and construct all county roads not on the state system) have about the same conditions to cope with as the state. The interest and sinking funds on state highway bonds are fixed amounts that can not be curtailed as maintenance and construction can. Almost all the counties have outstanding road bond obligations that must be met. So, for both the State Highway Department and the counties, the reductions in gas tax revenues must be borne solely by that portion of the revenue allocated to highway construction and maintenance.

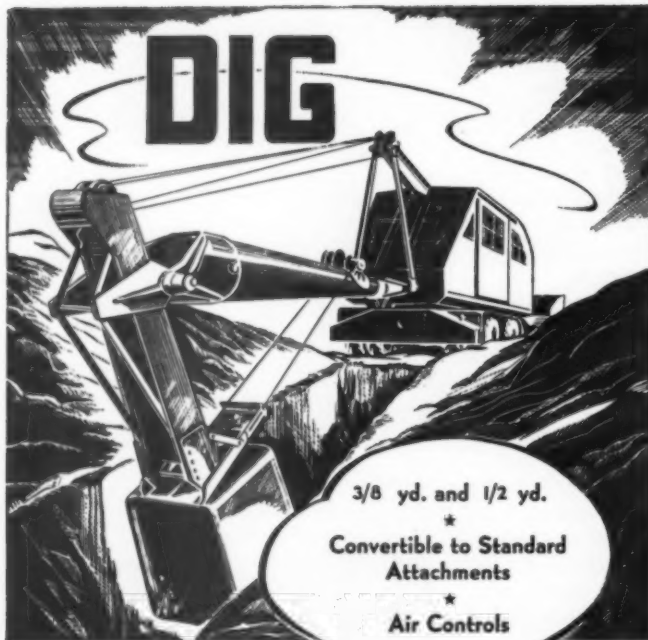


## Insley Helps *SPEED* *VICTORY*

Speed is an essential element in today's plans for victory . . . speed on the battlefield . . . speed on the production - for - war front. When you remember that speed has for a quarter of a century been an outstanding feature of Insley excavators, it's easy, then, to understand why all Insley production is now earmarked for our armed forces . . . why Insley excavators are playing a vital role in helping to *speed the day of victory*. **INSLEY MANUFACTURING COMPANY, Indianapolis, Indiana.**

# INSLEY

ROADS AND STREETS, May, 1943



Dig out the facts . . . why MICHIGAN Mobile Trench Hoes speed vital trench-digging jobs . . . why MICHIGAN speed, mobility, low maintenance costs pay dividends. Write for Bulletin T.



## LESSMANN MANUFACTURING COMPANY DES MOINES, IOWA



### Shovels—Lifts—Hoists—Cranes—8,000 built.

Many sizes now available on proper priorities.

Capacities: Shovel,  $\frac{1}{2}$  to  $\frac{3}{4}$  yard, lifts and dumping clearance optional, hoists or lifts 2 to 5 tons, cranes stationary boom or drop boom 1 to 5 tons.

Machines may be furnished to specification if desired.

Units powered by 25 or 45 horsepower. Rear tires, road builder type, 13:50-24 wide base rims. Front tires 6:00-20 truck and bus tires. Unit also equipped with special front axle and rear axle. Special steering gear and transmission ratios.

Units really built for shovel or hoist service, not an ordinary tractor unit.

Weight ranges from 5,000 to 12,000 pounds per unit.

Ask the owners of Lessmann units for there is a reason for so many re-purchases.

## GRUENDLER CRAFTSMANSHIP

Employed by U. S. A. in the WAR EFFORT

For Access Road and Air Base Construction

## PORTABLE CRUSHERS

Proper Size Aggregates—on the Job  
Balanced, Non-Tipping. Expertly designed to meet your exact requirements in proper size aggregates—larger capacity and quick mobility to and from job.



### GRUENDLER ENGINEERS

On the job to help you in any way, NOW and for your Post War Plans. Blue Prints or Practical Suggestions sent—No obligation.

Four Wheel Maintenance  
JAW CRUSHER with  
Power Unit

Write for . . .  
Bulletins and  
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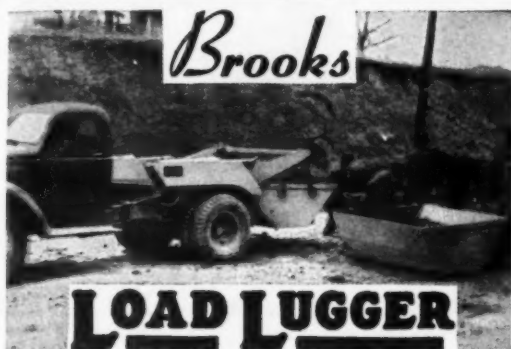


### Buffalo's Most Congenial Hotel

Today, you'll enjoy your stay at Hotel Lafayette more than ever! Extensively remodeled, and redecorated, this fine hotel offers new convenience and comfort—but the friendly hospitality is the same as ever. Excellent food, home-like rooms, reasonable prices. And remember: Hotel Lafayette is Buffalo's most centrally located hotel. Moderate rates: Single, \$2.75 up; Double, \$4.50 up; special rates for 4 or more. Write for Folder E.

HOTEL LAFAYETTE, BUFFALO, N. Y. • • K. A. KELLY  
Manager





## for Road and Street Jobs

This shows the quick and simple method of moving materials by the Load Lugger system. Handy, one-piece buckets are spotted in the roadway or along street curbs.

They are easily filled at low level, then hoisted, hauled and dumped. This keeps your trucks going all day long . . . no idle time waiting for load-ups.

With manpower getting more scarce, the LOAD LUGGER is more important than ever before. Write for Catalog No. 44.

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KNOXVILLE, TENNESSEE



## UNTIL THE SHOOTING ENDS

...the BYERS crane you need is being shipped to an outfit that needs it more than you do.

In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.

## WHEN THE WAR IS WON

Byers will offer you new, improved, faster mobile cranes and shovels for peacetime jobs.

**BYERS** CRANES AND SHOVELS  
RAVENNA, OHIO  
DISTRIBUTORS THROUGHOUT THE WORLD

## Ostergren Heads New Northwest Good Roads Assn. Officers

Ben F. Ostergren, St. Paul, was elected president of the Northwestern Good Roads Assn. at its recent meeting in Minneapolis, succeeding J. O. Saltness, Montevideo, Minn. Mr. Ostergren is also president of the Minnesota Rural Letter Carriers Assn. Vice-presidents are D. T. Carlson, Willmar; Judge Mark Nolan, Duluth; J. P. Coughlin, Waseca. Secy.-Treas. is E. W. Moeller, Minneapolis.

Speakers at the meeting included E. S. Ward, Willmar, Kandiyohi County Engineer and president, Minnesota County Highway Engineers Assn.; Geo. Diebler, Duluth, St. Louis County Engineer; and H. E. Palmer, Hastings, Dakota County Engineer. A. C. Leonard, Rochester, Olmsted County engineer, led a panel discussion on post-war planning.

## A. C. Berg Named Manager of Gar Wood Division

A. C. Berg has been appointed manager of the Road Machinery Division of Gar Wood Industries, Inc., Detroit, according to G. A. Bassett,

President. Mr. Berg, who joined the Company in 1919, became Assistant Manager of the Road Machinery Division when the division became a



part of Gar Wood Industries, Inc., in 1934. R. S. Headley has been appointed Assistant Manager to Mr. Berg.

## LaCrosse, Wis., Has Plans Drawn for Post-War Airport

According to City Engineer John H. Barth, the City of LaCrosse is contemplating an airport and right now the commissioners are busy setting a price on the various lands that are to

be condemned for this airport construction. The grading plans are complete, together with location and profiles and cubic yard computations. The electric plans are also complete. The plans are for a complete large airport. Unless federal aid is provided sooner, all development will be held as a post-war project and will be piece-meal according to this master plan.

## New Trade Literature

KEYSTONE ASPHALT PRODUCTS COMPANY, 43 East Ohio St., Chicago, Ill., has just issued a new illustrated catalog on its pavement products. Included are valuable data on Keystone master board tongue-and-groove joints and their proper installation; also Keystone fibre expansion joints, pre-moulded expansion joints, expansion joint sealing compound and Kapco sewer joint compounds, with specifications and latest list prices.

ROADS AND STREETS, May, 1943

## PIONEER CONVEYORS

Sectionalized Steel Frames  
Save Time—Money and  
Material.

★ ★ ★ ★ ★  
Specify Pioneer on  
your next job.

**PIONEER ENGINEERING WORKS**  
1515 CENTRAL AVE. MINNEAPOLIS, MINNESOTA  
*Manufacturers of Quarry, Gravel Pit and Mining Machinery*

## SILVER KING HIGHWAY MOWER



● Watch out for those minor damages that might put your highway mower out of action for the duration. A little extra care prevents extra wear and repair!

If you own a Silver King, you'll see, more than ever, what it means to have a mowing unit ENGINEERED for the job. If you want replacement parts now to insure tip-top "good-as-new" performance tomorrow, write. We will be glad to serve you.

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**THE FATE-ROOT-HEATH CO.**  
PLYMOUTH, OHIO

## NEED A BIG Trailer?

*La Crosse Makes Them  
Up To 200 Ton Capacity—*  
★ ★ WRITE OR WIRE ★ ★

**LA CROSSE TRAILER & EQUIPT. CO.**  
LA CROSSE, WISCONSIN U. S. A.

### Some Common Geological Terms for Engineers

(Continued from page 52)

- Hirst—A bank of sand in or along a river.  
Horse—A mass of country rock lying within a vein.  
Hummock—A small elevation; hillock.  
Humus—The organic portion of the soil.  
Hygroscopic—Having the property of readily absorbing moisture from the atmosphere.  
I  
Iceland Spar—Transparent calcite; largely used for optical purposes.  
Impervious bed—A bed or stratum

through which water will not move under ordinary hydrostatic pressure.

Inface—The cliff portion of a cuesta.  
Infusorial Earth—Diatomaceous earth; tripolite.

Intermontane—Lying between mountains.

Intratelluric—Taking place deep within the earth.

Iron Ocher—Oxides of iron.

Isinglass—Mica in thin transparent sheets.

Isogonic Chart—A chart showing lines of equal magnetic declination.

#### J

Jasper—A red, yellow, brown, or black dense opaque variety of chert.

Jet—A dense black lignite.

Jet Coal—Cannel coal.

Joint Planes—Natural fractures in rocks.

#### K

Karn—A pile or heap of rock.

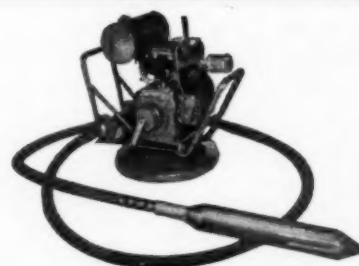
Kieselguhr—German name for diatomaceous earth.

#### L

Lacustrine—Deposits formed in the bottom of lakes.

Lake Pitch—Asphalt from the Pitch Lake, Trinidad.

Lava Flow—A stream of lava, or molten rock.



Concrete

## VIBRATORS and GRINDERS

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ELKHART **White Mfg. Co.** INDIANA

## "TWO BATTLESHIPS"

The equivalent in weight of two large battleships is the contribution of "FLEX-PLANE" in saving of steel for the last two years by use of "FLEX-PLANE" ribbon and other contraction joints.

## FLEXIBLE ROAD JOINT MACHINE CO.

WARREN, OHIO, U. S. A.

Layer—A bed or stratum of rock.

Lewis Hole—An opening made by drilling two or three holes near together and channeling out the intervening rock.

Line of Bearing—The direction of the strike or outcrop.

Lithification—The consolidation of sediments into rock.

#### M

Manjak—A black variety of bitumen having a brilliant luster and a conchoidal fracture.

Mantle Rock—The loose, unconsolidated rock material, such as gravel, sand, soil, etc., resting on top of the solid rock.

## Reliance

**CRUSHING, SCREENING  
and WASHING UNITS**

● Up to 2000 Tons a Day ●

|            |             |                |
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| Crushers   | Bins        | Drag-Lines     |
| Elevators  | Pulverizers | "GAYCO"        |
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**UNIVERSAL ROAD MACHINERY CO.**  
Kingston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd.  
340 Canada Cement Co., Montreal, Que., Can.



**SAVE 50% ON FUEL AND WAITING TIME**



**HEAT AND MELT TAR, PITCH, ASPHALT**

**Twice as Fast**

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Complete outfits on skids or on steel tires, capacities 80, 110 and 165 gallons. All sizes can be obtained with hand spray attachment. Send for FREE BULLETIN No. 194RS. For full information of concrete curing machines, tool and surface heaters, asphalt tools and accessories, etc. Write for FREE Catalog No. 240RS.

NEW cleaning and degreasing tanks and sprayers to keep equipment in condition (Bulletin 250RS).

**AEROIL BURNER CO., INC.**  
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Si le hace falta un camión para labores de nivelar, para las de acarreo de materiales en condiciones de las más difíciles, o para alzar la nieve después de nevar, o para otros servicios semejantes, no encontrará en ninguna parte algo que iguale a un camión Ford convertido Marmon-Herrington, con TODAS SUS RUEDAS MOTRICES. Los precios son sorprendentemente bajos y el costo del funcionamiento, por lo económico, una verdadera revelación. Escriba pidiendo prospectos descriptivos.

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ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan illustrated CATALOG today.

**VULCAN TOOL MFG. CO.**  
QUINCY, MASS.

**Master Stream**—The chief stream of a region.

**Metagabbro**—A rock known as metamorphosed gabbro (trap).

**Metallic Iron**—Metal-iron as distinguished from iron ore.

**Mexican Onyx**—A variety of calcite, chiefly from Mexico and used for interior decoration.

**Monadnock**—A residual rock, hill, or mountain standing above a plain.

**Monolith**—A single stone or block of stone, of large size.

**N**

**Nigger Head**—A boulder or rounded field stone. A black nodule formed in granite. A hard piece of rock, sometimes found in coal seams.

**Nunatak**—An island of bedrock in a glacial field; a hill projecting through and entirely surrounded by the ice.

**O**

**Orogeny**—Refers to the process of mountain building.

**Orthoclase**—A potash feldspar.

**Outcrop**—The cropping out of a rock stratum; exposed at or near the surface of the ground.

**P**

**Palisade**—A line of bold cliffs, especially one showing basaltic columns.

**Paper Coal**—A variety of brown coal deposited in thin layers like sheets of paper.

**Friable**—Easy to break.

**Period**—A unit of geological time, smaller than an era and larger than an epoch.

**Petrous**—Hard, like stone.

**Piedmont**—Lying or formed at the base of mountains; as a piedmont glacier.

**Physiography**—Physical geography; a description of the natural features of the surface of the earth.

**Pipeclay**—Masses of fine clay found embedded in the hydraulic gravel banks. A highly plastic and fairly pure clay of a grayish white color.

**Porosity (Of Rock)**—The percentage volume of the total pore space in a given volume of rock.

**Potter's Clay**—Pure plastic clay, free from iron.

**Pozzuolana**—A volcanic tuff quarried near Pozzuoli, Italy, and used in the manufacture of hydraulic cement.

**Profile (Soil)**—Successions of horizons in the mantle rock produced by weathering downward from the surface.

**Pumice**—General term applied to lava so vesiculated as to resemble froth.

**Q**

**Quarry**—An open pit or surface working for the extraction of rock.

**Quarry Water**—Water found in the pores of rock when first quarried.

**Quartz**—The crystalline mineral of the composition  $\text{SiO}_2$ .

**Quartzite**—Metamorphosed, or hardened sandstone.

**Quicksand**—Sand which is shifting, easy movable or semi-liquid.

**R**

**Random Stone**—Term applied by quarrymen to quarried blocks of any dimension.

**Range Coal**—Small lump coal.

**Red Iron Ore**—Hematite.

(Continued on page 95)

**Unfailing Light**

**FOR THE WORLD AT NIGHT**



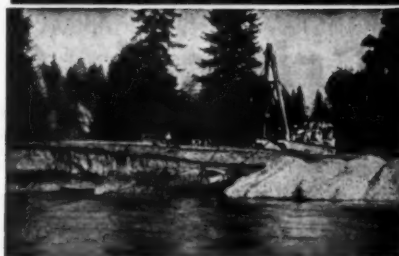
**EMBURY AIR-PILOT LANTERN**

Dependable, streamlined, storm-proof, long-burning—the one lantern that has everything.

Military requirements have first call, but we are striving to meet essential civilian demands. Please anticipate your needs well in advance.

Embury Mfg. Co., Warsaw, N.Y.

**DIG and HAUL**  
... at low cost



**WHEREVER** materials are to be moved a distance of 100 ft. or more, a Sauerman Scraper or Cableway cuts costs, because it is able to reach the entire distance and dig, haul and place the materials without the help of other labor or equipment.

There is a definite saving, both in capital cost and operating expense, when a Sauerman machine is used for long range work.

Tell us about your digging and stockpiling problems. We will offer suggestions and send our catalog.

**SAUERMAN BROS., INC.**

588 S. CLINTON ST., CHICAGO



# Clearing House

P&H 600 No. 3053 Shovel, 1 yd., 40' Boom. Good shape, load now, FOB Mo., \$6,000.00.

Thew Lorain 1 1/4 wide Dipper, 32T. Wt. FOB KC. \$4,000.00. Old but good, all gears 90%. Fine for coal or rock.

Byers rebuilt Bearcat Jr., high lift, late model Shovel, air tired factory trailer. FOB KC., \$4,500.00. Ready to go.

We have practically everything you need.

Call Wire Write

**KENNEY MCHY. CO.**

2136 Jefferson, Kansas City, Mo.

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FOR SALE:

44C Barber-Greene Ditcher.  
10S Koehring Mixer on 2 Pneumatic Tires.

4" Rex Self Priming Pump—Gasoline Power.

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522 Barber-Greene Pneumatic Tired Bucket Loader—Gasoline Power.

**PAUL L. MATCHETTE COMPANY**

Exclusive Distributors for Barber-Greene Co.

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**New or Rebuilt  
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Headquarters for  
**REPAIRS** — any make.  
Factory Service. We will  
also buy your old in-  
struments or take them in trade.

A complete line of Engineering  
Instruments and Equipment for Field  
or Office. Write for Bulletin RS 85.

**WARREN-KNIGHT CO.**

Manufacturers of Sterling Transits and Levels  
136 N. 13th St. Philadelphia, Penna.

## TIRE REPAIRS

In all sizes of tractor, truck, wheelbarrow,  
passenger, or 1800x24 tires.

An EQUA-FLEX "Sectional" repair con-  
structed in your tire is guaranteed. Best results  
and prompt service!

We have a selection of pre-war quality used  
passenger and truck tires.

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## FOR SALE

P and H TRENCHING MACHINE, cut 15  
feet deep and 36 inches wide, Serial 2875,  
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## SALESMAN WANTED

MAN NOW CALLING ON TRACTOR OWNERS  
AND DEALERS, ROAD CONTRACTORS, MU-  
NICIPALITIES, COUNTY AND STATE HIGH-  
WAY DEPTS. TO ADD SIDE LINE OF  
ESSENTIAL TRACTOR REPAIR PART. SPLEN-  
DID FIELD FOR IMMEDIATE PROFITABLE  
VOLUME. GIVE FULL DETAILS OF LINES  
SOLD AND TERRITORY COVERED. ALLIED  
STEEL PRODUCTS, INC., NBC BLDG., CLEVEL-  
AND, O.

## WANT TO BUY

- 2 Locomotive Cranes
- 2 Whirley Cranes 30' or 125' Boom
- 5 Portable Conveyors 40' to 60'
- 3 1 1/2 to 3 ton Tandem Rollers
- 6 10,000 Gal. Cap. Steel Tanks
- 1 Mile Portable Track

**Leicester Contracting Corporation**  
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## FOR SALE

Used guaranteed motor truck scales and  
warehouse scales—no priority needed.  
Vibrating Screens and Coal Crushers. Low  
prices. Immediate delivery.

Bonded Scale Company, Att: RS,  
Columbus, Ohio

## EQUIPMENT WANTED

WANTED: One R-B Fine Grader, late  
model and in good condition. One shovel  
front for Model 18 Northwest Crane. Ap-  
ply Phil H. McGuire, Box 34, 25th St.  
Station, Norfolk, Va.

# Critical Construction Machinery

## GENERATORS

2 new Kohler 10 KVA, 120 volt,  
Single Cycle, 60 volt manual  
control.

9 new Kohler 1 1/2 KVA, AC,  
1500 watt, gas engine driven,  
120 volts, single phase, Light-  
ing Generators.

5 new Kohler, 10 KVA, 240  
volts, 3 phase, 60 cycle, gas  
engine driven Generator Sets,  
manual control with or with-  
out housing.

5 new Lister-Blackstone "Nite-  
Hawk" Portable 5 KW, 120  
volts, AC, single phase, 60  
cycles, Generator Sets, com-  
plete with four 1,000 watt  
Crouse-Hinds reflectors mount-  
ed on 8' telescopic extensions  
mounted on two-wheel spring  
mounted trailer.

1 rebuilt 30 KVA Superior die-  
sel engine driven Generator,  
V-belt drive, 220 volts, 3  
phase, 60 cycle, AC Genera-  
tor, .8 power factor, powered  
with Superior 100 h.p. 6-cyl-  
inder diesel engine. Machine  
in excellent condition.

## GENERATORS (Cont.)

1 rebuilt 18.7 KVA Superior  
diesel engine driven Genera-  
tor, direct connected, powered  
with 2 cylinder engine, 1200  
r.p.m. and Columbia Genera-  
tor, 220 volts, 3 phase, 60 cy-  
cle, .8 power factor. Machine  
in excellent condition.

1 rebuilt Buda 15 KW gas en-  
gine driven Generator Set,  
110 volts, DC.

1 rebuilt 7 1/2 KW Winton gas  
engine driven, 110 volts, DC  
Generator Set.

## COMPRESSORS

1 rebuilt LeRoi 60 gas engine  
driven Compressor on 2 rub-  
ber tires.

1 new LeRoi 60 gas engine  
driven Compressor on two-  
wheeled trailer.

1 new LeRoi 105 gas engine  
driven Compressor on two-  
wheeled trailer.

2 rebuilt LeRoi 160 two-stage,  
gas engine driven, mounted  
on four steel wheels.

2 new LeRoi 210 gas engine  
driven on four steel wheels.

1 rebuilt Sullivan 220 cu.ft.  
portable gas engine driven,  
on 4 steel wheels.

## ROLLERS

2 rebuilt Huber 10-ton, 3-wheel,  
gas engine driven Rollers, re-  
built and guaranteed.

1 rebuilt 5-ton, 3-wheel Galion  
gas Roller.

1 rebuilt 10-ton, 3-wheel Galion,  
1939 Model with scarifier.

## BUCKETS

1 new Williams Model 13-M, 1/2  
yd. General purpose Clam-  
shell Bucket.

1 new Williams Model 20-X, 3/4  
yd. Dragline Bucket.

1 new Williams Model 14-F, 1/2  
yd. Clamshell Bucket.

1 rebuilt Page 1 1/4 yd. Dragline  
Bucket.

1 rebuilt Page 3/4 yd. Dragline  
Bucket.

1 rebuilt Bucyrus-Erie 3/4 yd.  
Dragline Bucket.

1 rebuilt Haiss 1/2 yd. Clamshell  
Digging Bucket.

1 rebuilt Kiesler 3/4 yd. Clam-  
shell Digging Bucket.

1 rebuilt Kiesler 1/2 yd. Clam-  
shell Material Handling  
Bucket.

## PUMPS

8 new Carver 2" 10,000 g.p.h.,  
mounted on two-wheeled  
trailer.

2 new Carver 2" 7,000 g.p.h.,  
mounted on two-wheeled  
trailer.

7 new Carver 3" 15,000 g.p.h.,  
mounted on steel wheels, self-  
priming centrifugal pumps.

2 new Carver 40,000 g.p.h., self-  
priming centrifugal pumps on  
two-wheeled trailer.

1 new Carver 90,000 g.p.h., self-  
priming centrifugal pump on  
two-wheeled trailer.

## CRANES

1 used P & H Model 600,  
Shovel Front with 1 1/4 cu.yd.  
Dipper.

## MISCELLANEOUS

1 Kerrick Cleaner on 2 Rubber  
Tires.

1 Gledhill Leveler on 4 Rubber  
Tires.



**CHICAGO CONSTRUCTION EQUIPMENT CO.**

13912 SOUTH HALSTED ST. • CHICAGO, ILL.

PHONE  
RIVERDALE  
1300



**Regional Dip**—Refers to stratified rocks having an average inclination in some general direction over a wide extent of land.

**Relief Map**—A model of an area in which its inequalities of surface are shown in relief.

**Rhyolite**—A fine-grained igneous rock, containing quartz and potash feldspar with some biotite mica.

**Riprap**—A foundation or sustaining wall of stones thrown together without order of any kind.

**Road Metal**—Rock suitable for surfacing macadamized roads and for foundations for asphalt or concrete highways.

**Rock Asphalt**—Rock impregnated with asphalt from evaporation of natural petroleum.

**Rock Gas**—Same as natural gas.

**Rock Oil**—Same as petroleum.

**Rubble**—Rough, irregular pieces of broken stone.

## S

**Saddle Back**—A hill or ridge having a concave outline at the top.

**Salina**—A salt marsh or salt pond.

**Salt Bottom**—A flat piece of alkali ground.

**Sand Dune**—A mound, ridge or hill of loose sand.

**Sandstone**—A consolidated rock composed of sand grains cemented together.

**Saw Back**—A mountain range having sharp peaks of about equal height.

**Scabble**—To work or shape roughly as a stone.

**Scoria**—Irregular, rough, clinker-like fragments of lava.

**Seat Clay**—Fire clay.

**Seep**—A spot where water or petroleum oozes out slowly.

**Seismology**—The science of earthquakes.

**Set-Up**—Instrument station for plane table, alidade or transit observations.

**Shale**—Laminated sediments in which the particles are of clay size.

**Shell Limestone**—Sedimentary rock composed chiefly of fossil shell fragments.

**Solution Grooves**—More or less parallel furrows that may develop on inclined and vertical surfaces of soluble rocks like marble or limestone.

**Steptoe**—An island or bedrock in a lava flow.

**Sun Cracks**—The fissures developed when mud or clay is dried for a sufficiently long time under the sun's rays.

The network of cracks usually enclose polygonal areas.

**Syncline**—A trough in the rock beds.

## T

**Tableland**—A plateau, or elevated region of flat country several hundred feet above sea level.

**Tape**—A long, thin, narrow band of rock or mineral.

**Tepetate**—Volcanic tuff from Mexico.

**Test Pit**—A shallow pit sunk in search of mineral.

**Tombolo**—A sand bar built by the sea tying an island to the mainland.

**Trap Rock**—Such igneous rocks as diabase, gabbro, diorite, and/or basalt.

**Tuff**—Cemented volcanic ash.

## U

**Undercut Quarry**—A quarry in which the walls slant outward so as to make the floor space wider with increasing depth.

## V

**Vadose**—A term applied to seepage waters occurring below the surface and above the water-table.

**Varved Clay**—Clay and silt having annual layers.

**Verde Antique**—A dark green rock composed essentially of serpentine.

**Volcanic Ash**—Finely divided fragmental rock material violently blown from volcanoes.

## W

**Wad**—Bog manganese.

**Water-Glass**—Sodium silicate.

**Water-Lime**—Hydraulic lime.

# ENGINEERING TERMINOLOGY

Published and for sale by

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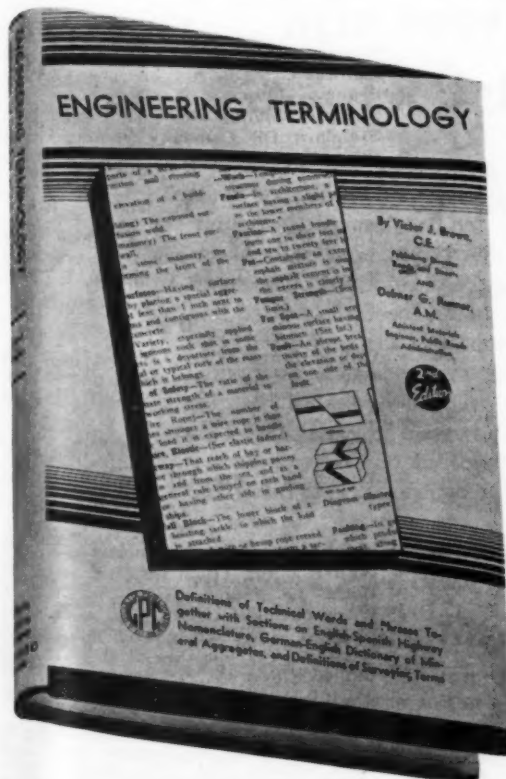
Definitions of Technical Words and Phrases, Second Edition

By V. J. Brown

Publishing Director, ROADS AND STREETS and

D. C. Runner

Assistant Materials Engineer,  
U. S. Public Roads Administration



A word or phrase in one branch of engineering may have an entirely different meaning in some other branch. Various branches of applied engineering, all of which spring from the common root of natural and physical science, have found it expedient to develop a specialized vocabulary. This book is a step toward avoiding misunderstanding and difficulty from this cause for purposes of contracts, correspondence, agreements, price lists, specifications, etc., between the different branches of engineering, the public, and other professions. It is arranged in dictionary form. The book fills a need or want in engineering literature. It also initiates the standardization of engineering terms. Valuable appendices include English-Spanish terms; Spanish-English words; German-English aggregate terms; Symbols for Hydraulics; Standard Pump Classifications; Materials for Pumping Various Liquids; Abbreviations for Scientific and Engineering Terms; Symbols for Mechanics, Structural Engineering and Testing Materials; Weights and Measures; Conversion Factors; Temperature Interconversion Tables; Chemical Elements, Atomic Numbers, Weights, etc.; Standard Graphical Symbols for Radio; Log of Early Discoveries About the Electron Tube.

439 pages—Dark red buchram binding.

Price, \$4.00 Plus Postage

# Safe- Quick Acting- Interchangeable!



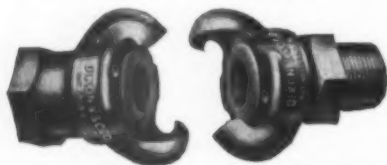
## "AIR KING" Quick Acting Universal Type HOSE COUPLING

Here's a quick-acting hose coupling with a reputation for safety and efficiency on all types of pneumatic tools. A "twist of the wrist" as ends are pressed together makes a connection that actually becomes *tighter* under pressure . . . no danger of accidental opening of the line under a "full head."

Locking heads are identical for all sizes of hose and threaded pipe ends, permitting coupling of any two sizes of hose, or hose to pipe, within the "Air King" size range, without adapters, bushings or extra fittings.

A special auxiliary locking device, for services of hazardous nature or those involving extreme vibration, makes it impossible for coupling to come apart until manually released.

Hose Ends:  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ ",  $\frac{1}{2}$ " and 1"  
Pipe Ends:  $\frac{3}{4}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ ",  $\frac{1}{2}$ " and 1"



Threaded I.P.T.  
Female End

Threaded I.P.T.  
Male End

Sold by Manufacturers and Jobbers of  
Mechanical Rubber Goods

# DIXON

## VALVE & COUPLING CO.

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PHILADELPHIA, PA.

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Chicago • Birmingham • Los Angeles • Houston

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**KILLED OR INJURED AT WORK LAST YEAR—**

# 1,618,000 MEN!

**HELP PREVENT MANY ACCIDENTS BY USING**

**AMERICAN CABLE TRU-LAY *Preformed* WIRE ROPE**

During the first twelve months of this war more than 1½ million men were killed or injured by industrial accidents. That tremendous loss in productive time and needed man-power undoubtedly prevented the quick winning of several battles. Indeed, according to the National Safety Council, the lost-time through accidents could have supplied war equipment for 110,000 soldiers, sailors or marines. *And the shame of it all is that many of these accidents were needless.*

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**PREFORMED WIRE ROPE.** American Cable TRU-LAY is a *safer* rope to handle because it is *preformed*. TRU-LAY is flexible, tractable, willing to do what is required of it without crankiness. It resists kinking and snarling and possesses remarkable fatigue resistance. More than this, broken crown wires in TRU-LAY *Preformed* do not wicker out to jab and tear workmen's hands. TRU-LAY doesn't ravel (and ruin itself) when cut or broken. For your next line, specify American Cable TRU-LAY *Preformed*. Do everything possible to reduce lost-time accidents.

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Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

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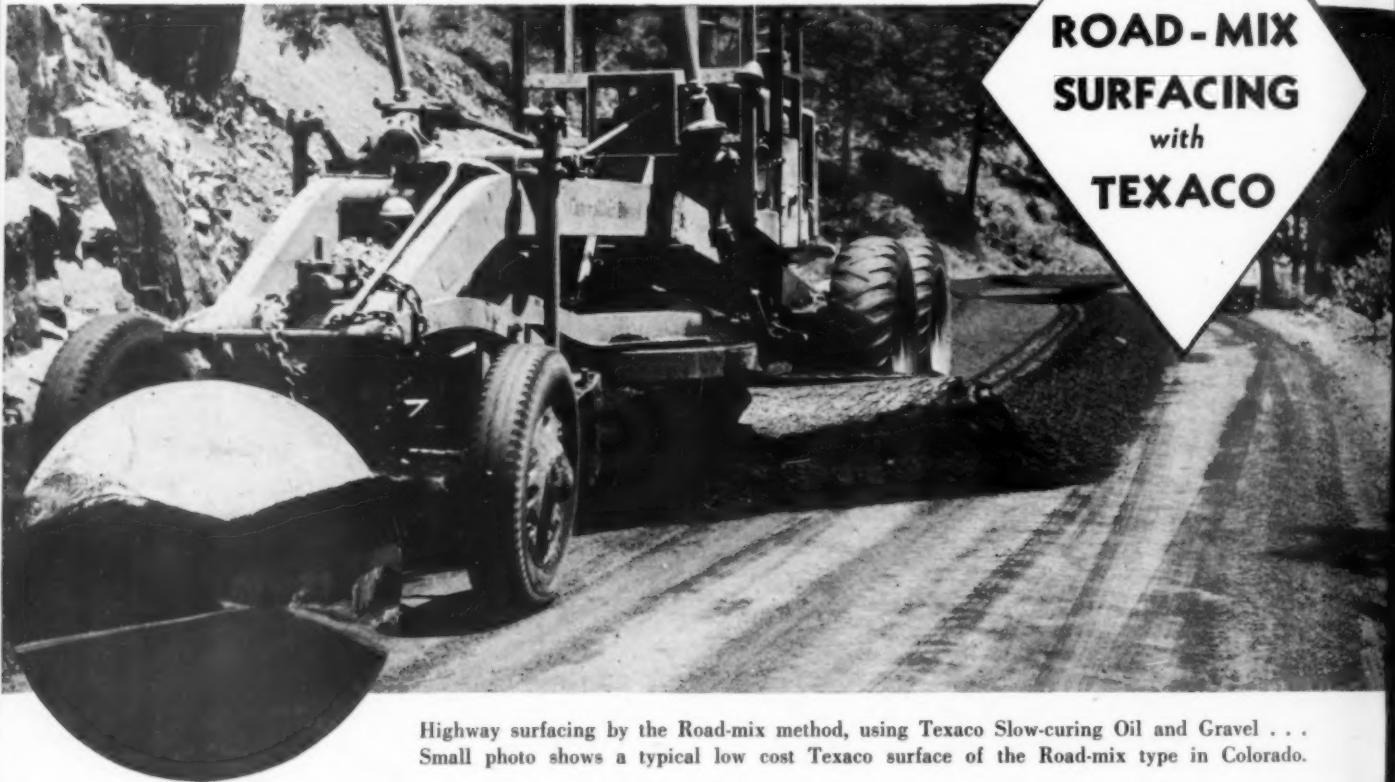


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A series of advertisements pointing out  
how TEXACO Asphaltic products  
can fit into your program

**2**

**ROAD-MIX  
SURFACING  
with  
TEXACO**



Highway surfacing by the Road-mix method, using Texaco Slow-curing Oil and Gravel . . .  
Small photo shows a typical low cost Texaco surface of the Road-mix type in Colorado.

Here is the problem: How to build a road surface adequate to serve fairly heavy traffic for years, when your available equipment is limited and your budget small?

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One or more power graders, an asphalt distributor and possibly a roller are the only equipment required for this type of construction. Some times, all or part of the aggregate for a Texaco Road-mix surface is already on the street or road, or else it is available not far from the project. A

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Texaco street or road surfaces of the Road-Mix type, because of their low cost and the limited equipment needed to construct them are within reach of every community. Hundreds of miles are now in the service of States, Counties and Municipalities throughout the country.



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Boston Philadelphia Richmond Chicago Houston Jacksonville

# TEXACO ASPHALT